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LITERATURE AND DATA SEARCH OF WATER RESOURCE INFORMATION OF THE COLORADO, UTAH, AND WYOMING OIL SHALE BASINS

LEWIN AND ASSOCIATES, INC.
Denver, Colorado Washington, D.C.

BUREAU OF LAND MANAGEMENT

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Lewin and Associates, Inc.
Denver, Colorado Washington, D.C.

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LIST OF VOLUMES

Volume 1: Users' Guide

Volume 2: Bibliography of Water Resources Literature

Volume 3: Bibliography of Water Resources Literature

Volume 4: Bibliography of Water Resources Literature

Volume 5: Bibliography of Water Resources Literature

Volume 6: Topical Bibliography of Water Resources Literature

Volume 7: Listing of Personnel and Agencies

Volume 8: Colorado Data Compilations

Volume 9: Utah Data Compilations

Volume 10: Wyoming I Data Compilations

Volume 11: Wyoming II Data Compilations

Volume 12: Process Water Use

ABSTRACT

Accession Number:
@ 101
Abbey, David, 1979, Water supply/demand alternatives for electric generation in the Colorado basin: Rep. LA-7662-MS (Informal Rep.), Los Alamos Scientific Laboratory, Los Alamos, N.M., 16 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 03

Energy development in the western states, particularly the Colorado River Basin, poses two water-related concerns: (1) that water availability may constrain development and (2) that industrial water use may have a negative impact on other water users.

In this paper, the author examines water use for electricity generation in the Colorado Basin. Substitution of dry cooling for wet cooling can almost eliminate the consumptive use of water at an electric plant. The cost of water saved, however, is quite high compared to the cost of water supply alternatives such as water transfers and groundwater and waste water use. Water use plans of utilities in the region reflect both an incentive for surface water conservation and the high cost of dry cooling.

Considering that dry cooling adds a small amount to the cost of generating electricity, one may conclude that water availability has an insignificant effect on the potential for development. Although detailed evaluation of the impacts on water resources is beyond the scope of this paper, the author does suggest that these concerns may be exaggerated.

889

ABSTRACT

Accession Number:
@ 101.1
Ackerman, D.J., 1981, Geochemistry and hydrology of oil-shale spoils: in Water-resources investigations of the U.S. Geological Survey in Colorado - fiscal year 1981, U.S. Geological Survey Open-File Report 81-150, p. 115.

Contact: Danny Ackerman (status)

Key Categories: SURFACE, LEACHING

Access Code: 011 Use Code: 02

The purpose of this program is to describe the mineralogy and geochemistry of weathered piles of spent shale. The hydraulic characteristics and quality of percolate waters will be determined. Observation and sampling wells will be located in the piles and strata beneath them and samples collected for major and trace constituent analysis.

ABSTRACT

Accession Number:
@ 102

Adams, D.B., Bauer, D.P., Dale, R.H., and Steele, T.D., 1982, Reservoir-development impacts on surface-water quantity and quality in the Yampa River basin, Colorado and Wyoming: U.S. Geological Survey Water-Resources Investigations 81-30 [scheduled for publication 1981-1982].

Contact: Briane Adams (status)

Key Categories: WYOMING, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, COMPUTER MODELS

Access Code: 002 Use Code: 01

The Yampa River basin in northwestern Colorado and south-central Wyoming is an area in which development of the coal resources and associated economy is accelerating. This development includes increased use of the water resources of the area, which will have a direct impact on the quantity and quality of the water resources.

Current (1979) regulation of the basin's surface water by reservoirs is minimal. As part of 18 surface-water projects, 35 major reservoirs have been proposed with a combined total storage of 2.18 million acre-feet (2,688 cubic hectometers), which is 41 percent greater than the mean annual outflow from the basin.

Three computer models were used to demonstrate a method of evaluating future impacts of reservoir development in the Yampa River basin. Four different reservoir configurations were used in the analysis in order to simulate the effects of different degrees of proposed reservoir development.

A multireservoir-flow model included both within-basin and transmountain diversions. Simulations indicated that in many instances the proposed diversion amounts would not be available for either type of diversion. For example, a proposed industrial diversion of 130 cubic feet per second (3.64 cubic meters per second) from the proposed Blacktail Reservoir would not be possible from 85 to 93 percent of the time. A corresponding frequency analysis of various reservoir-storage levels indicated that most reservoirs would be operating with small percentages of total capacities, and, in most instances, with less than 20 percent of conservation-pool volumes.

Simulations using a dissolved-solids model indicated that extensive reservoir development could increase average annual concentrations at most locations. At Steamboat Springs, Colo., for example, most upstream water could be diverted, which could result in increased dissolved-solids concentrations during an average water year. Extensive reservoir development could reduce the larger May or June maximum mean monthly flows at Deerlodge Park, Colo., which is located downstream from the confluence of the Yampa and the Little Snake Rivers, from 460,000 to 250,000 acre-feet per month (567 to 308 cubic hectometers per month) and could increase the mean annual dissolved-solids concentrations by 60 percent.

Simulations using a single-reservoir model indicated that no significant water-temperature stratification would occur in most reservoirs because of limited reservoir storage. The model simulation also indicated that there could be a reduced range in water temperatures in most of the proposed reservoirs, such as the proposed Juniper Reservoir, where the inflow water temperature could range from 0°C to 26°C, while the unregulated outflow water temperature could range from 4°C to 18°C. In addition, the model simulations indicated that the range of specific-conductance values could be less in reservoir outflows than in reservoir inflows.

ABSTRACT

Accession Number:
@ 103
Adams, D.B., Goddard, K.E., Patt, R.O., and Galyean, K.C., 1982, Hydrologic data for Roan and Parachute Creek basins in Northwest Colorado: U.S. Geological Survey Open-File Report [scheduled for publication 1982].

Contact: Briane Adams (status)
Lucy Lauglin (copy)

Key Categories: COLORADO, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, SPRINGS, CLIMATE

Access Code: 002 Use Code: 01

This is the basic data report for Adams et al., 1982 (Abstract No. 104). This report presents tabular summaries of water quality and quantity data for streams and springs in the Roan and Parachute Creek Basins. It also tabulates available data on biological parameters, sediment, and climate. Field data from several coreholes at the Getty Oil site and the Naval Oil Shale Reserve are presented.

ABSTRACT

Accession Number:
@ 104
Adams, D.B., Goddard, K.E., Patt, R.O., and Taylor, O.J., 1982, Water Resources of the Roan and Parachute Creek basins, Northwest Colorado: U.S. Geological Survey Professional Paper, [scheduled for publication 1982-1983].

Contact: Briane Adams (status)

Key Categories: COLORADO, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SPRINGS, AVAILABLE WATER BY BASIN, CLIMATE, COMPUTER MODELS

Access Code: 002 Use Code: 01

This interpretative report summarizes and discusses the natural hydrologic conditions in the Roan and Parachute Creek basins of northwestern Colorado. The data on which this report is based are presented in Adams et al. 1982 (Abstract No. 102). Changed

This report focuses on surface water resources. It presents hydrologic and water quality data for springs and streams in the area and discusses water quality in the vicinity of existing oil shale sites, such as Anvil Points. It presents water budgets for each basin and flood frequency analyses. Stream water quality, sediment, and benthic inverterbrate analyses are reviewed. Spring water quality data is analyzed to determine geologic sources. Groundwater quantity and quality data for several Getty oil core holes and for other core holes on the Naval Oil Shale Reserve are presented. A preliminary computer modeling study of the region is presented.

ABSTRACT

Accession Number:
@ 104.1
Adams, R.C., and others, July 1976, Technical and cost evaluation of candidate large scale open pit oil shale mining methods in Colorado, v. I (431 p.), v. II (1032 p.): report prepared by Sun Company, Suntech, Inc. for U.S. Bureau of Mines.

Contact: NTIS (copy)

Key Categories: COLORADO, GROUNDWATER QUANTITY, COMPUTER MODELS, SURFACE, RECLAMATION, PROCESS WATER USE

Access Code: 011 Use Code: 01

This report describes the feasibility of mining the oil shale deposits of the Piceance Creek basin in Colorado by an integrated open pit system. The study is based upon a comprehensive analysis of pertinent environmental, economic, and engineering factors. Ten mining cases are investigated, and the mine design and cost estimates for each case are presented in this report. Nine of the cases represent three cutoff grades, defining oil shale ore as equal to and above 15 gallons per ton (gpt), 20 gpt, and 25 gpt, at three ore production levels of 500,000 tons per day (TPD), 1,250,000 TPD, and 2,500,000 TPD. The tenth case is an alternative design of the 500,000 TPD production rate at the above 15 gpt cutoff grade. The report summarizes the results of a computer modeling study of mine pit dewatering and includes estimates of water requirements for open pit mining of oil shale.

The report consists of Volume I, a technical and cost comparison of the ten cases; Volume II-Part I, a detailed explanation of the estimating methods used; and Volume II-Part 2, a more detailed discussion of the technical and cost features of the ten cases than is presented in Volume I.

891

011

ABSTRACT

Accession Number:
@ 104.2
The Aerospace Corp., Jan. 1981, Oil shale surface retorting, environmental characterization information report: Rep. DOE/EP-0015, 62 p.

Contact: George Rotariu (copy)

Key Categories: SURFACE, EFFLUENTS, PROCESS WATER USE

Access Code: 011 Use Code: 01

This report is a synthesis of environmental data and current information relevant to a hypothetical commercial-sized Paraho retort (50,000 bbl/day). The report performs a material balance around such a plant, calculating quantities of products and byproducts for 21 environmental points of interest. These points include mining, air emissions from mining, shale fines from crushing and sizing, controlled runoff from on-site shale storage, water requirements for retorted shale and sludge moistening and disposal, controlled water runoff from retorted shale disposal, cooling tower blowdown, evaporative and drift losses from wet cooling towers, makeup water, and others. For each point, the report gives a brief description of the pollutants or resources involved and the standards to be met. It also presents sample calculations and a bibliography. A separate section discusses the overall physical requirements of the plant for land and water; the approximate number of personnel involved in constructing and operating the facility; and the health and safety hazards associated with mining and processing.

ABSTRACT

Accession Number:
@ 105
U.S. Dept. of Agriculture, Dec. 1979, Water for energy development in
the Northern Great Plains and Rocky Mountain Regions: Economics,
Statistics, and Cooperative Service Staff Rep, NRED 80-3.

Contact: BLM - Craig (loan)

Key Categories: COLORADO, WYOMING, UTAH, WATER LAW, ENVIRONMENTAL, PRESENT WATER USE, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY

Access Code: 102 Use Code: 02

The purpose of this report is to describe water resource use, availability, and potential for satisfying large-scale coal and oil shale developments in the Northern Great Plains and Rocky Mountain Regions of the United States. The description represents the first phase of a project whose ultimate objective is the construction of an interregional model of coal and shale oil production and processing in the United States.

ABSTRACT

Accession Number:
@ 106
U.S. Dept. of Agriculture, 1978, Summary of snow survey measurements, Wyoming and pertinent measurements in Colorado, Montana, and South Dakota, 1919-1978: 189 p.

Contact: Snow Survey Unit (copy)

Key Categories: WYOMING, CLIMATE, COLORADO

Access Code: 152 Use Code: 01

Snow survey measurements from 1919 through the 1978 season for all active snow courses in Wyoming are summarized in this report. Data on discontinued courses are available on request. Information on pertinent snow courses in Montana and Colorado is included. Contact respective Soil Conservation Service state offices for more details on these courses. This report supersedes all previous Wyoming summaries.

All snow course data included in this summary are stored at the U.S. Department of Agriculture Computer Center at Fort Collins, Colorado. Arrangements can be made through the Soil Conservation Service state office, Casper, to reproduce these data for use in data processing programs.

ABSTRACT

Accession Number:
@ 107
U.S. Dept. of Agriculture, Sept. 1978, Green River basin, Wyoming cooperative river basin study: main report, Economics, Statistics, and Cooperatives Service, Forest Service, and Soil Conservation Service.

Contact: Wyoming State Engineer's Office (loan)

Key Categories: WYOMING, SALINITY, PRESENT WATER USE, SEDIMENT

Access Code: 011 Use Code: 01

The Wyoming Green River Basin Study was a cooperative federal, state, and local study. The purpose of the study was to define the magnitude of water and land resource problems and to suggest alternative plans for use in facilitating the coordinated and orderly conservation, utilization and management of water and related land resources of the basin. It focuses on selected problems identified in the rural watershed areas for which USDA has programs for providing technical and monetary assistance toward solutions. These problems include: shortage of late season irrigation water on meadow hayland and pasture; salt loading in the Green River from the Big Sandy, Blacks Fork and Henrys Fork tributaries; inefficient use of irrigation water on irrigated pasture and hayland; low production and under-utilization of wood fiber; erosion in excess of one-half ton per acre from rangeland and accelerated streambank erosion; unused available Colorado River compact water; loss or deterioration of fish and wildlife habitat; and others.

ABSTRACT

Accession Number:
@ 108
Ahern, J.J., March 1982, Multi-method, multi-lab study of in-situ oil shale water quality: draft report prepared by Wyoming Water Resources Research Institute for Laramie Energy Technology Center.

Contact: Dick Poulson (loan)

Key Categories: EFFLUENTS, SURFACE, IN-SITU

Access Code: 002 Use Code: 01

This report presents the results of an intercomparison study on six separate samples of oil shale process waters. Large volumes of samples from the Paraho, Occidental, and Geokinetics oil shale processes were homogenized, aliquoted, and submitted to various commercial laboratories for the analysis. The resulting data were analyzed to assess the reliability of standard analytical methods to determine precision and accuracy of the data and to assess the environmental significance of the effluents.

ABSTRACT

Accession Number:
@ 109
Ahern, J., 1982, Groundwater data: Wyoming Water Resources Research Institute backup files for UIC program report.

Contact: John Ahern (access)

Key Categories: WYOMING, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 002 Use Code: 02

The Wyoming Water Resources Research Institute (WWRRI) prepared the Underground Injection Control (UIC) Program groundwater reports for the State of Wyoming. Two of these reports fall within the Wyoming oil shale basins: Ahern et al. 1981 (Abstract No. 110) and Collentine et al., 1981 (Abstract No. 259). These reports evaluated the groundwater resources in the Wyoming oil shale basins, and they include records of wells in the area.

Handwritten files containing extensive groundwater data are available in the WRRI backup files. Available data included static water levels and water quality data from WATSTOR, Bureau of Land Management, U.S. Forest Service, mine plans, Wyoming State Engineer's Office and other sources. Some of this information (pertaining to drinking water sources) was reported in the UIC reports. However, much of it was not, and it is available in these files.

ABSTRACT

Accession Number:
@ 110
Ahern, J., Collentine, M., and Cooke, S., 1981, Occurrence and characteristics of ground water in the Green River basin and Overthrust Belt, Wyoming: Wyoming Water Resources Research Institute Rep. GW-WY-001, Vols. V-A and V-B, 123 p. plus appendices and plates.

Contact: EPA Region VIII Library (loan)

Key Categories: WYOMING, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, PRESENT WATER USE

Access Code: 011 Use Code: 01

This report presents the findings of a groundwater study of the Green River Basin and Overthrust Belt in southwestern Wyoming. The study was funded by the U.S. Environmental Protection Agency (EPA) for the Underground Injection Control (UIC) program. This groundwater report is one of seven which covers all of the state of Wyoming except for the Yellowstone National Park area.

This report delineates, characterizes, and documents groundwater occurrence, flow, quality, and use in the Great Divide and Washakie basins. This information was developed from a field geologic reconnaissance of parts of the study area and adjacent areas; collection, screening, and analyses of existing water well and oil test well data; and review of previous reports.

Volume V-A of the report describes the population, land use, topography, climate and drainage, structural geology, stratigraphy and hydrostratigraphy in the study area. Agricultural and public and private domestic water use is discussed and tabulated. Groundwater occurrence and flow patterns are defined and major water-producing zones are described. Groundwater quality is discussed and compared with drinking water standards. Appendices include tabulations of hydrologic properties of major water-bearing zones, records of wells and springs, a discussion of how to determine aquifer properties from yield-drawdown-duration data from constant yield well performance tests, and chemical analyses of groundwaters sampled by WRRI. Volume V-B consists of a series of maps which include: a structure-contour map on top of the Lower Cretaceous Dakota formations; wells permitted for domestic use; TDS maps for the Precambriam to Upper Cretaceous, Tertiary, and Quaternary aquifers; and a potentiometric surface map of pre-Hilliard-Baxter formations.

Changed to n

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ABSTRACT

Accession Number:
@ 110.1
Allen, L.E., Dec. 1976, A subalpine snowmelt model: Wyoming water
resources series no. 65, 163 p.

Contact: NTIS (copy)

Key Categories: WYOMING, COMPUTER MODELS, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

A digital computer model for simulating daily watershed runoff from snowmelt under subalpine conditions has been developed in first-generation form. Solar radiation is the primary source of snowmelt. The areal extent of snowcover is calculated with a submodel derived through stepwise multiple regression techniques. Snowmelts are adjusted for snowpack conditions and distribution, and become the runoff from each segment to be routed through flow points as daily discharge. Comparison of simulated flows with observed flows indicated reasonably satisfactory model performance. The model was developed and tested for the Nash Fork Basin in southeastern Wyoming, but there are no theoretical reasons to prevent application of the model to other watersheds where snowmelt is the dominant source of streamflow.

ABSTRACT

Accession Number:
@ 111
Allen, L.E., and Smith, V.E., 1972, Water resources observatory stream-flow data, water years 1965 through 1971: University of Wyoming, Water Resources Research Institute, 92 p.

Contact: University of Wyoming (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY

Access Code: 182 Use Code: 03

Data from water level recorders and rated stream sections are presented for stations operated by the Wyoming Water Resources Research Institute. The reduced data are processed through the University of Wyoming's digital computer. Program output presented herein includes station identification, mean daily flows in second-feet, total monthly flows in second-foot-days, mean monthly flows in second-feet, monthly discharges in acre-feet, and annual flow in acre-feet for each water year.

ABSTRACT

Accession Number:
@ 112
Alley, W.M., 1982, Relative importance of ground-water and surface-water supplies to oil-shale development, Piceance basin, Colorado: U.S. Geological Survey Open-File Report 82-340

Contact: Bill Alley - USGS (status)

Key Categories: COLORADO, PRESENT WATER USE, COMPUTER MODELS

Access Code: 002 Use Code: 01

Vast deposits of oil shale are contained in the Piceance basin in northwestern Colorado. Potential sources of water for development of these resources include the Colorado and White Rivers, streams within the Piceance basin, an oil-shale aquifer system, and various deep aquifers underlying the Piceance basin. This paper investigates the relative importance and value of information on these sources of water.

The analysis was performed by simulating the sensitivity of required active storage capacity (VMAX) of a hypothetical reservoir on the White River to different assumptions about water demands and the contributions from the various sources of water. Both steady-state and transient analyses were performed.

In the steady-state analysis, an oil-shale industry was assumed at equilibrium with a constant demand for water. This analysis indicated that considerable uncertainty exists in several important hydrologic variables related to oil-shale development. Of the factors explored, one of the more important ones affecting estimates of VMAX was the supply of water available from the oil-shale aquifers. For example, the current estimate of average annual natural recharge to the oil-shale aquifers is approximately equal to the amount of water required by an oil-shale industry producing 250,000 barrels of oil per day and requiring 3 barrels of water per barrel of shale-oil produced. Because the oil-shale aquifer system contains a large amount of ground water and will be at least partially dewatered as part of oil-shale mining, this water could be an important source of water for shale-oil production. However, many factors contribute to the large uncertainty in the amount of ground water that will be available. Among the sources of uncertainty are the interactions of surface water and ground water in the Piceance basin, the amount of available water in storage in the oil-shale aquifers, and existing water rights and their priority and ownership in the Piceance basin.

Other factors to which estimates of VMAX were found to be sensitive were the supply of water available from the Colorado River and the requirements for downstream releases on the White River. Compared to the uncertainty in other factors, water-supply estimates are shown to be insensitive to uncertainty in evaporation estimates.

ABSTRACT

Accession Number:
@ 113
Alley, W.M., Britton, L.J., and Boyd, E.L., 1978, Reconnaissance evaluation of water resources for hydraulic coal mining, Grand Hogback coal field, Garfield and Rio Blanco counties, Colorado: U.S. Geological Survey Open-File Report 78-885, 37 p.

Contact: Lucy Laughlin (copy)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE, SEDIMENT

Access Code: 011 Use Code: 02

Surface-water and ground-water data were compiled for the parts of the Colorado River and the White River basins in and adjacent to the Grand Hogback coal field. The data were evaluated to assess the quantity and quality of water resources available in the area for use in hydraulic coal mining.

Based on discharge records, surface-water supplies of most streams should be adequate to meet the demands for hydraulic mining of 1 million tons of coal per year with a recycled water system. However, on some of the smaller streams in the area, some storage of water may be required for use during low-flow periods to meet minimum-flow requirements for downstream reaches. Other potential sources of water include Rifle Gap Reservoir, Harvey Gap Reservoir, and ground water from valley-fill deposits along major streams and rivers.

The surface and ground water in the study area should be of adequate quality for use in hydraulic mining, with the possible exceptions of suspended-sediment concentrations that periodically may be as much as 18,800 milligrams per liter in streams in the Rifle Creek drainage, and dissolved-solids concentrations that are greater than 20,000 milligrams per liter in some aquifers. Data are insufficient to assess the potential impact of hydraulic coal mining on downstream water quality.

193

ABSTRACT

Accession Number:
@ 113.1
American Institute of Chemical Engineers, 1977, The Second Pacific Chemical Engineering Congress (PAChEC'77): v. I and II.

Contact: AIChE (copy)

Key Categories: PROCEEDINGS, EFFLUENTS, SURFACE, IN-SITU, LEACHING, ENVIRONMENTAL

Access Code: 011 Use Code: 01

This symposium proceedings presents technical papers on a wide variety of topics, including energy, petroleum and petrochemicals management, forest products, and the environment. Two of the sessions included a number of papers on environmental problems of oil shale processing.

ABSTRACT

Accession Number:
@ 114
Amy, G.L., 1978, Contamination of groundwater by organic pollutants leached from in-situ spent shale: Ph.D. Dissertation, University of California, Berkeley, 203 p.

Contact: Gloria Gill - LBL (copy)

Key Categories: LEACHING, IN-SITU

Access Code: 011 Use Code: 01

Both batch-mode and continuous-flow column experiments were conducted to study the leaching phenomenon. Leachate derived from the batch-mode experiments was analyzed for organic carbon, organic nitrogen, phenols, and acid/base/neutral fractions. The highest levels of organic carbon were detected in leachate derived from spent shale produced during either inert gas retorting or combustion retorting using recycle gas. The highest levels of phenols were observed in leachate obtained from spent shale produced during inert gas retorting while significant levels of organic nitrogen were also detected in various leachate samples. The most predominate organic fraction measured in leachate samples was the neutral fraction associated with spent shale produced during inert gas retorting. Batch-mode equilibrium results were analyzed according to the Freundlich and Langmuir isotherm models. Kinetic analysis was made of the continuous-flow column experiments. Internal diffusion appeared to be the most likely rate-limiting mechanism for leaching from combustion-retorted spent shale. In contrast, no single mass transfer mechanism appeared to control the leaching phenomenon for inert gas-retorting spent shale over the entire range of leaching time examined. It is concluded that the leaching effect is a potentially chronic problem.

ABSTRACT

Accession Number:
@ 115

Amy, G.L., Hines, A.L., Thomas, J.F., and Selleck, R.E., July 1980, Groundwater leaching of organic pollutants from in situ retorted oil shale - a mass transfer analysis: Environmental Science and Technology, v. 14, no. 7, p. 831-835.

Contact: Gary Amy (copy)

Key Categories: LEACHING, IN-SITU

Access Code: 011

Use Code: 01

The potential degradation of groundwater quality by organic pollutants leached from in situ retorted oil shale was assessed by conducting a mass transfer analysis of laboratory data. Two unique samples of in situ retorted oil shale were investigated in a series of laboratory experiments. Results of these laboratory experiments were subjected to a mass transfer analysis to determine the rate-limiting step involved in the leaching of organic pollutants by groundwater. This mass transfer analysis suggested that, for one of the samples, internal diffusion through the porous infrastructure of retorted oil shale particles is the rate-controlling mass transfer step. For the other sample, no single rate-controlling step wa conclusively identified, although it appeared that internal diffusion played a key role in the overall leaching phenomenon. Since internal diffusion is an extremely slow mas transfer process, it is anticipated that low, relatively constan levels of organic pollutants will appear in groundwater and persist for long periods of time. This implies that there may be a chronic, long-term groundwater pollution problem i areas of future in situ oil shale development.

✓ 894

ABSTRACT

Accession Number:
@ 115.1
Amy, G.L., Thomas, J.F., and Hines, A.L., 1978, Leaching of organic residuals from simulated in situ retorted oil shale: in American Chemical Society, Division of Fuel Chemistry Preprints, v. 23, no. 2, p. 125-133.

Contact: Gloria Gill - (copy)

Key Categories: IN-SITU, LEACHING

Access Code: 011 Use Code: 02

This article describes the results of preliminary experiments on the leaching of organic carbon from simulated in-situ spent shale. Four types of spent shale from the Lawrence Livermore Laboratory experimental retort were leached with distilled water in batch and column experiments and the effluents analyzed for organic carbon, electrical conductivity, and pH. The final results from this study are presented in Amy, 1978 (Abstract No. 114).

ABSTRACT

Accession Number:
@ 116
Amy, G.L., and Thomas, J.F., 1977, Factors that influence the leaching of organic material from in situ spent shale: in Proceedings of the Second Pacific Chemical Engineering Congress, v. I, American Institute of Chemical Engineers, New York, New York, p. 398.

Contact: Gary Amy (copy)

Key Categories: LEACHING, IN-SITU

Access Code: 011 Use Code: 02

A series of batch and continuous flow experiments were run in order to assess the potential for contamination of groundwater by organic material leached from in situ spent shale. The specific objectives of these experiments were to 1) estimate the concentration of organic material present in leachate derived from various types of in situ spent shale, and 2) identify variables that affect the concentration of organic material in leachate. Concentrations of total organic carbon (TOC) as high as 50 milligrams per liter were detected during the experimentation. Factors that significantly influence the concentration of organic material present in leachate included 1) retorting conditions associated with spent shale, 2) spent shale particle size, 3) water temperature, and 4) leaching time.

✓ 895

ABSTRACT

Accession Number:
@ 116.1
Anderson, A.D., and others, 1980, Toxicity of an in-situ oil shale process water to rainbow trout and fathead minnows: Archives of Environmental Contamination and Toxicology, v. 9, p. 171-179.

Contact: Harold Bergman (copy)

Key Categories: IN-SITU, EFFLUENTS

Access Code: 011 Use Code: 02

An *in situ* oil shale process water, designated Omega-9 water, was used in flow-through bioassays with fathead minnows, rainbow trout and rainbow trout eggs. Of the two fish species, rainbow trout were more sensitive to acute exposure to Omega-9 water with 96-hour LC_{50} dilutions of 0.51% and 0.41% in two independent determinations. In embryo-larval studies, the length of fry from eggs hatched and maintained in 0.16% process water was significantly less than that of eggs hatched in control water. A solution of the 13 major inorganic constituents of Omega-9 water, with a 96-hour LC_{50} of 0.56% for rainbow trout, showed that inorganics accounted for most of the acute toxicity of Omega-9 water.

ABSTRACT

Accession Number:
@ 117
Anderson, J.C., and Kleinman, A.P., 1978, Salinity management options for the Colorado River - damage estimates and control program impacts: Utah Water Research Laboratory Rep. UWRL/P-78/03, 344 p.

Contact: Utah State University (loan)

Key Categories: SALINITY, UTAH, COLORADO, WYOMING

Access Code: 002 Use Code: 02

This report evaluates economic impacts of increasing levels of salinity for agricultural, municipal, and industrial users of the Colorado River water. Various salinity management options also are identified and their economic impacts quantified. Direct agricultural, municipal, and industrial damage was estimated by identifying specific areas affected and the type and severity of each type of damage. This information was used to estimate direct economic impacts on the upper basin using physical and economic models. Indirect impacts were also estimated using various input-output models.

896

ABSTRACT

Accession Number:
@ 117.1
Anderson, J.C., and Keith, J.E., April 1977, Energy and the Colorado River: Natural Resources Journal, v. 17. no. 2, p. 157-167.

Contact: Denver Public Library (loan)

Key Categories: UTAH, PRESENT WATER USE, WATER LAW

Access Code: 000 Use Code: 02

✓ 897

ABSTRACT

Accession Number:
@ 117.2
Anderson, M.H , Anderson, J.C., Keith, J.E., and Clyde, C.G., 1973
The demand for agricultural water in Utah, Utah Water Research
Laboratory Rep., 52 p.

Contact: Utah State University Library (loan)

Key Categories: UTAH, PRESENT WATER USE

Access Code: 011 Use Code: 03

This paper attempts to provide some of the economic information necessary for sound decisions in the development and use of Utah's water resources with respect to agriculture.

Water is recognized as an essential element in Utah's agricultural economy. It is the subject of much controversy and litigation and yet most discussion of the subject is based on opinions and prejudice rather than upon the basis of sound scientific evidence. Utah was divided into ten drainage regions (hydrologic subregions) and the presently irrigated and potentially irrigable land according to land class were estimated for each county or portion of a county within each of the regions. Water use factors, crop rotation constraints, costs of production, yields, product prices, and costs of bringing new land into production were also estimated. These values were then used in a linear programming model to estimate a normalized demand (marginal value product) schedule for water to be used in agricultural production within each region. The amount of water made available to the production model for each hydrologic subregion was varied so that the model created a shadow price (marginal value product) at each level. These were then combined to estimate the relationship between the quantity of water and its economic value (a demand schedule or function).

The general conclusions from the study indicate that most parts of the state suffer from a water shortage in that more production could be obtained from the presently irrigated land through the use of more water and/or the transfer of water from lands with low productivity to higher quality land. There are, however, many cases of water waste. The model is not designed to adequately evaluate the economic feasibility of water importation projects but those regions with the greatest potential for development are identified. The models indicate that, given the present cost and price structure, agriculture alone probably could not economically justify most water importation schemes at this time.

√ 898

ABSTRACT

Accession Number:
@ 117.3
Andrews, E.D., Feb. 1981, Measurement and computation of bed-material, discharge in a shallow sand-bed stream, Muddy Creek, Wyoming: Water resources research, v. 17, no. 1, p. 131-141.

Contact: Denver Public Library (loan)

Key Categories: WYOMING, SEDIMENT

Access Code: 002 Use Code: 01

Measured and computed bed-material discharges were compared to determine the most suitable approach for a shallow sand-bed stream. On 35 occasions suspended and bedload sediment discharges were measured in Muddy Creek, Wyoming, under water discharge conditions ranging from 0.15 to 1.57 cu meters per sec. The field results were compared with results using equations by Engelund-Hansen, Yang, Shen-Hung, and Ackers-White. These equations predicted bed-material discharges of between 0.5 and 2 times the observed rates 60-79% of the time. Laboratory flume data under the same flow conditions were very close to measured bed-material discharges. (Although the equations are useful when hydraulic conditions and sediment characteristics are similar to those used in formulating the equations, differences in these conditions make field measurements more desirable.)

✓ 899

ABSTRACT

Accession Number:
@ 117.4
Andrews, E.D.. 1981, Hydraulic and geomorphic characteristics of stable alluvial stream channels in the Rocky Mountain Region; project summary in Water-resources investigations of the U.S. Geological Survey in Wyoming, Fiscal Year 1980, Open File Report 81-20, p. 103-104

Contact: Ed Andrews (status)

Key Categories: COLORADO, WYOMING, UTAH, SURFACE WATER QUANTITY, SEDIMENT

Access Code: 011 Use Code: 01

This program is developing consistent hydraulic and geomorphic relations for stream-channel stability in northeastern and south-central Wyoming. These relations will link the sediment and water discharge of a stream with the values of velocity, depth, width, roughness, slope, and sinuosity required to maintain stability. Data collection and analysis will be directed toward determining the hydraulic and geomorphic factors that affect alluvial-channel stability and the amount of time required for a stream to adjust to a change in quantity of water and sediment supplied to it from the watershed.

✓ 900

ABSTRACT

Accession Number:
@ 117.5
Andrews, E.D., 1980, Effective bankfull discharges of streams in the Yampa River basin, Colorado and Wyoming: Journal of Hydrology, v. 46, p. 311-330.

Contact: Denver Public Library (loan)

Key Categories: WYOMING, SEDIMENT, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 01

The effective discharge is defined as the increment of discharge that transports the largest fraction of the annual sediment load over a period of years. Increments of the average annual total sediment load transported by various discharges were calculated by the flow-duration sediment-transport-curve method for 15 gaging stations in the Yampa River Basin of Colorado and Wyoming. A total sediment-transport curve was constructed for each gaging station by adding measured instantaneous suspended-sediment discharges to bedload-sediment discharges computed by the Meyer-Peter and Mueller relation. The 15 gaging stations had diverse hydraulic and sediment characteristics. Contributing drainage area ranged from 51.8 to 9,960 sq km, and mean-annual discharge ranged from 0.040 to 43.9 cu m/s. To compare the effective discharge with the bankfull discharge, cross sections were surveyed in a self-formed reach of the channel in the vicinity of each gaging station. The bankfull discharge was defined as the discharge which filled the channel to the level of the flood plain. At all gaging stations, the effective discharge and the bankfull discharge were nearly equal. Thus, the stream channels appear to be adjusted to their effective discharge.

ABSTRACT

Accession Number:
@ 118
Andrews, E.D., 1978, Present and potential sediment yields in the Yampa River basin, Colorado and Wyoming: U.S. Geological Survey Water-Resources Investigations 78-105, 33 p.

Contact: Public Inquiries Office (copy)

Key Categories: WYOMING, SEDIMENT

Access Code: 011 Use Code: 01

Average annual suspended- and total-sediment loads in streamflow were determined by the flow-duration sediment-transport-curve method at 18 sites in the Yampa River basin, Colorado and Wyoming. These computations indicate that about 2.0 million tons (1.8 million metric tons) of sediment are carried by the Yampa River at Deerlodge Park during an average year. Significant areal differences in the sediment yield from various parts of the basin also were determined. The lower Little Snake River subbasin contributes about 60 percent of the total basin sediment yield, although it represents less than 35 percent of the area and supplies less than 3 percent of the streamflow. In contrast, the upland (eastern) one-third of the basin contributes only about 14 percent of the sediment yield but 76 percent of the streamflow.

Projected economic development of the basin, especially surface mining of coal, will impact the physical environment. Depending upon the amount of coal mined, as well as the extent and location of land disturbed, an estimated 10,000 to 30,000 tons per year (9,000 to 27,000 metric tons per year) of additional sediment will be contributed to the main-stem Yampa River. The impact of this additional sediment load will depend upon where within the basin it enters the stream channel. Although the increased sediment load due to surface mining represents approximately 2 percent of the present total-sediment load, it could increase the sediment load of the upper reaches of the Yampa River by as much as 30 percent.

901

ABSTRACT

Accession Number:
@ 118.1
ARIX, Jan. 1982, Comprehensive drainage plan for city of Rifle,
Colorado - v. I, storm drainage master plan, draft: Greeley,
Colorado, 135 p. plus figures.

Contact: none

Key Categories: COLORADO, SURFACE WATER QUANTITY, ENVIRONMENTAL, FLOOD

Access Code: 002 Use Code: 02

The purpose of this study is to evaluate the potential impact of major and minor storms on the City of Rifle from the creeks that flow through the City and from the internal drainage patterns in the City. This study identifies potential flooding hazards from storms and proposes a construction program for alleviating the most serious flooding. An ongoing drainage maintenance program is also proposed for the City of Rifle and its planning areas.

In addition, and probably more important, a separate volume: "City of Rifle Drainage Design Criteria Manual" is included and will be used by the City to establish guidelines for future planning so that efforts of City officials, developers, and engineers may be coordinated toward the end that the ultimate needs of the community for storm drainage facilities are met without undue duplication of effort or expense.

Pages 902

ABSTRACT

Accession Number:
@ 118.2
U.S. Army Corps of Engineers, 1981, Water resources development in Wyoming, 1981: 40 p.

Contact: BLM - Cheyenne (loan)

Key Categories: WYOMING, AVAILABLE WATER BY BASIN

Access Code: 152 Use Code: 02

This booklet provides timely, concise information concerning the water resources development program of the Corps of Engineers in Wyoming. Although it is a regularly constituted branch of the United States Army, with extensive military engineering and construction responsibilities, the Corps is also actively engaged in developing and implementing plans for flood control, navigation, and water conservation as primary civil functions under Federal law.

903

ABSTRACT

Accession Number:
@ 118.3
U.S. Army Corps of Engineers, May 1981, Water resources development in Utah, 1981.

Contact: BLM - Cheyenne (loan)

Key Categories: WYOMING, AVAILABLE WATER BY BASIN

Access Code: 000 Use Code: 02

✓ 904

ABSTRACT

Accession Number:
@ 118.4
U.S. Army Corps of Engineers, April 1973, Flood plain information: Colorado River and Rifle, Government, Hubbard Gulch Creeks, Rifle, Colorado: prepared for the City of Rifle by Sacramento District, 34 p.

Contact: Bill Stanton (status)

Key Categories: COLORADO, FLOODS

Access Code: 002 Use Code: 02

The study area comprises the flood plains along a 3.9 mile reach of the Colorado River (total drainage area 6,930 square miles), the lower 2.8 miles of Rifle Creek (drainage area 201 sq. mi.), and the lower 0.8 mile of Hubbard Gulch Creek (drainage area 8 sq. mi.) in the corporate limits of Rifle. Because Rifle is a local center for retail trade, transportation and recovery and processing of mineral resources, continued development is expected with pressure for expansion on the flood plains. which are already extensively developed. Damaging floods occur every six years. Major flooding along the Colorado River, usually the result of late spring snowmelt, is characterized by moderate peaks, long duration of flows, and marked diurnal fluctuation. Flood damage is chiefly due to agricultural development caused by streambank erosion and deposition of silt. Flooding on the creeks normally results from summer couldbursts runoff and is characterized by high peak flows, short duration, and small volumes. Vegetation, 5 bridges, 2 culverts and pioneer ditch diversion structures where silt accumulation has contributed to overbank flooding during high flows obstruct flood flows. The intermediate regional flood and the standard project flood on the Colorado River would have peak discharges of 45,000 and 56,000 cubic feet per second respectively. IRF and SPF peak discharges on Rifle Creek would be 5,700 and 13,000 CFS, respectively. Channel and overbank velocities for these streams are in the range of 8.9 feet per second and 2-4 ft/sec respectively.

ABSTRACT

Accession Number:
@ 119
Arnow, T., and others, 1965, Ground-water conditions in Utah, spring
of 1965: Utah Water and Power Board, Cooperative-Investigations
Report No. 3, 99 p.

Contact: USGS - Salt Lake City (loan)

Key Categories: UTAH, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 03

This is the second in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Water and Power Board.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow. It also contains supplementary data that are related to groundwater use in some individual areas.

The report includes individual discussions of the most important areas of groundwater withdrawals in the State for the calendar year 1964. Water-level fluctuations, however, are described for the period spring 1964 to spring 1965.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-64. Other information that encompasses the study area is combined with data from other parts of the State.

ABSTRACT

Accession Number:
@ 120
Arnow, T., and others, 1964, Ground-water conditions in Utah, spring of 1964: Utah Water and Power Board, Cooperative-Investigations Report No. 2, 104 p.

Contact: USGS - Salt Lake City (loan)

Key Categories: UTAH, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 03

This is the first in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Water and Power Board.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow. It also contains supplementary data that are related to groundwater use in some individual areas.

The report includes individual discussions of the most important areas of groundwater withdrawals in the State for the calendar year 1963. Water-level fluctuations, however, are described for the period spring 1963 to spring 1964.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-63. Other information that encompasses the study area is combined with data from other parts of the State.

ABSTRACT

Accession Number:
@ 121
Austin, L.H., and Skogerboe, G.V., 1970, Hydrologic inventory of the Uintah Study Unit: Utah Water Research Laboratory, Utah State University Rep. PRWG 40-5, 182 p.

Contact: Utah State University (loan)

Key Categories: UTAH, CLIMATE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 01

This study classifies and inventories water resources in the Uintah Basin study area. The study includes useful discussions of study area physiography, geomorphology, geology, climate, ground water, surface water supply and quality, and the history of water development.

The study emphasizes the characterization of surface water resources, including the regional distribution of evaporation and precipitation, flow frequency analyses, flow duration, high and low flows, the relationship between precipitation and runoff, and surface water quality. In addition, the study area was subdivided into sub-areas based upon hydrologic, topographic, and climatic factors. A hydrologic balance approach which incorporated surface water input, output, and storage was used to characterize the surface water hydrology for each sub-area.

905

ABSTRACT

Accession Number:
@ 121.1
Bader, B.E., ed., Aug. 1981, Oil shale program twenty-first quarterly
report, Jan. 1981 through March 1981: Sandia National Laboratories
Rep. SAND 81-1659, 64 p.

Contact: NTIS (copy)

Key Categories: IN-SITU, SUBSIDENCE

Access Code: 011 Use Code: 03

This is an annual progress report on Sandia National Laboratories' oil shale program. This program is using field, laboratory, and modeling techniques to investigate various aspects of in-situ retort preparation including bed preparation, bed characterization and evaluation, retort characterization and evaluation, and retort stability and integrity.

ABSTRACT

Accession Number:
@ 122
Baker, C.H., Jr., and others, 1969, Ground-water conditions in Utah, spring of 1969: Utah Dept. of Natural Resources, Cooperative-Investigations Report No. 7, 61 p.

Contact: Utah Division of Water Resources (copy)
USGS - Salt Lake City (loan)

Key Categories: UTAH, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 03

This is the sixth in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow. It also contains supplementary data that are related to groundwater use in some areas.

The report includes individual discussions of selected major areas of groundwater withdrawals in the State for the calendar year 1968. Water-level fluctuations, however, are described for the period spring 1968 to spring 1969.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-69. Other information that encompasses the study area is combined with data from other parts of the State.

ABSTRACT

Accession Number:
@ 123
Baker, C.H., Jr., and others, 1967, Ground-water conditions in Utah, spring of 1967: Utah Dept. of Natural Resources, Cooperative Investigations Report No. 5, 89 p.

Contact: Utah Division of Water Resources (copy)
USGS - Salt Lake City (loan)

Key Categories: UTAH, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 03

This is the fourth in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow. It also contains supplementary data that are related to groundwater use in some areas.

The report includes individual discussions of the most important areas of groundwater withdrawals in the State for the calendar year 1966. Water-level fluctuations, however, are described for the period spring 1966 to spring 1967.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-67. Other information that encompasses the study area is combined with data from other parts of the State.

ABSTRACT

Accession Number:
@ 124
Baker, E.D., 1977, Reclamation potential of TOSCO II processed shale:
in Proceedings of the Second Pacific Chemical Engineering Congress,
v. I, American Institute of Chemical Engineers, New York, New York,
p. 403.

Contact: AIChE (copy)

Key Categories: SURFACE, RECLAMATION

Access Code: 011 Use Code: 02

Studies performed from 1965 to the present indicate that methods using both native and introduced plants are available to establish and maintain an adequate cover of vegetation on processed oil shale disposal areas. This paper discusses results of studies of processed shale from the TOSCO II Process, a retorting method developed by TOSCO Corporation. Although continued studies will help improve and refine the methodology, present knowledge is adequate to establish vegetation on the volume of processed shale produced from a commercial-size operation in areas with high reclamation potential.

ABSTRACT

Accession Number:
@ 125
Balcomb, K.C., Oct. 1968, Availability of water for oil shale development: Quarterly of the Colorado School of Mines, v. 63, no. 4, p. 853-856.

Contact: Colorado School of Mines (copy)

Key Categories: AVAILABLE WATER BY BASIN, COLORADO, PROCESS WATER USE, SURFACE, SALINITY

Access Code: 011 Use Code: 03

This paper briefly discusses various sources of storage or water for oil shale along the White, Green and Yampa rivers that were proposed or under various stages of development in the late 1960s. These include the Yellow Jack Reclamation Project, Una Reservoir, the West Divide Project, Ruedi Reservoir, and Green Mountain Reservoir.

ABSTRACT

Accession Number:
@ 126
Ballance, W.C., and Freudenthal, P.B., 1977, Ground-water levels in
Wyoming, 1976: U.S. Geological Survey Open-File Report 77-686.

Contact: Open-File Services Section (copy)

Key Categories: WYOMING, GROUNDWATER QUANTITY

Access Code: 152 Use Code: 03

Ground-water levels are measured periodically in a network of about 280 observation wells in Wyoming to record changes in ground-water storage. The areas of water-level observation are mostly where ground water is used in large quantities for irrigation or municipal purposes. This report contains maps showing location of observation wells and water-level changes from 1976 to 1977. Well history, highest and lowest water levels, and hydrographs for most wells are also included in this report.

The program of ground-water observation is conducted by the U. S. Geological Survey in cooperation with the Wyoming State Engineer and the city of Cheyenne.

ABSTRACT

Accession Number:
@ 127

Ballance, W.C., and Freudenthal, P.B., 1976, Groundwater levels in Wyoming, 1975: U.S. Geological Survey Open-File Report 76-598, 170 p.

Contact: Open-File Services Section (copy)

Key Categories: WYOMING, GROUNDWATER QUANTITY

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 128
Ballance, W.C., and Freudenthal, P.B., 1975, Groundwater levels in Wyoming, 1974: U.S. Geological Survey Open-File Report, 186 p.

Contact: Open-File Services Section (copy)

Key Categories: WYOMING, GROUNDWATER QUANTITY

Access Code: 000 Use Code: 03

906

ABSTRACT

Accession Number:
@ 128.1
Bamberg, S.A., Oct. 1975, Approaches to large-scale land reclamation in oil shale development: in Proceedings of the Environmental Oil Shale Symposium, Quarterly of the Colorado School of Mines, v. 70, no. 4, p. 95-103.

Contact: Colorado School of Mines (copy)

Key Categories: SURFACE, RECLAMATION

Access Code: 011 Use Code: 03

Considerations for the reestablishment of viable ecosystems on land disturbed by oil shale development activities are presented. Strategies and approaches for revegetations on different terrain and resulting from various types and intensities of disturbances are discussed. Conditions needed to balance the ecosystem components of plant productivity, consumers, and decomposition processes for long-term stability are reviewed.

ABSTRACT

Accession Number:
@ 129
Banks, C.E., Bradley, W.S., Franciscotti, B.C., and Huckelbury, J.L., March 1978, Simulated dewatering requirements at an oil shale surface mine, Piceance Creek basin, Colorado: in Mineral Industries Bulletin, v. 21, no. 2, Colorado School of Mines, 11 p.

Contact: Colorado School of Mines (copy)

Key Categories: COMPUTER MODELS, COLORADO, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

This report summarizes the results of a modeling study to determine dewatering requirements for variously sized open-pit mines located in the Piceance Creek Basin. The study focused on a 1,250,000 ton per day pit in 15 gallon per ton shale which reached an approximate size of 1.5 by 2.75 miles in 10 years.

The study used the modified Sun Company's 3-D Beta digital model traditionally used for hydrocarbon reservoirs. The model can simulate both homogeneous and heterogeneous reservoir rock characteristics using a gridded layer system as well as performance for single or multiple interrelated reservoirs. This model used input data not directly derived from field pumping tests, i.e., it used porosities and permeabilities instead of storage coefficients and transmissivities.

A four-layer system (atmosphere plus three aquifer layers) was used. The model first simulated steady-state conditions in the basin, and basin-wide potentiometric maps of upper and lower aquifers were computed.

The model was used to simulate three independent dewatering operations for variously sized pits and did not differentiate between discharge from storage and discharge from intercepted groundwater. The effects of desaturation and mine growth were not considered.

ABSTRACT

Accession Number:
@ 130
Bassett, D.L., and Jensen, M.C., Oct. 1972, Extreme maximum values of evaporation at selected stations in eleven western states and Texas: A Western Regional Research Publication, Washington State University, Washington Agricultural Experiment Station Bulletin 761, 16 p.

Contact: Bulletin Room (copy)

Key Categories: COLORADO, UTAH, CLIMATE

Access Code: 011 Use Code: 02

The publication contains extreme values of evaporation maxima for a network of stations in the eleven Western Region states and Texas.

This analysis was based on daily evaporation-pan records supplied by the National Weather Service through W-48 Technical Committee members and state climatologists. Stations selected had evaporation records long enough and good enough to support reasonable statistical analyses. Record length of 30 years was used when available. No station with fewer than 13 years of useful record was used.

Evaporation extremes, station locations, and brief station descriptions are presented together for each state. Stations relevant to oil shale bases are Grand Junction, Colorado and Fort Duchesne, Utah.

907

prospective

ABSTRACT

Accession Number:
@ 130.1
Bates, E.R., and Thoem, T.L., eds., 1980, Environmental perspective on the emerging oil shale industry: U.S. Environmental Protection Agency Rep. EPA-600/2-80-205a, 324 p.

Contact: Ed Bates (copy)

Key Categories: COLORADO, SURFACE, IN-SITU, EFFLUENTS, LEACHING, ENVIRONMNTAL

Access Code: 011 Use Code: 01

Oil shale deposits in the United States are among the richest and most extensive in the world. Estimates place total identified resources of medium and rich shales in the United States at 2 trillion equivalent barrels of oil. About 600 billion barrels are considered recoverable with present technology. This report summarizes the anticipated regulatory approach taken by the EPA toward oil shale development and is designed to serve as a reference and guide to EPA offices, Federal agencies, and private developers involved with the emerging oil shale industry.

The document conveys EPA's understanding and perspective of oil shale development by providing (1) a summation of available information on oil shale resources, (2) a summary of major air, water, solid waste, health, and other environmental impacts, (3) an analysis of applicable pollution control technology, including limitations, (4) a guide for the sampling, analysis, and monitoring of emissions, effluents, and solid wastes from oil shale processes, (5) suggestions for interim objectives for emissions, effluents, and solid waste disposal, and (6) a summary of oil shale technology, emissions, and effluents. The report provides a brief yet thorough discussion of the environmental problems of oil shale development.

For readers who wish further information on the topics covered in this volume, a list of Appendices referred to in the text, as well as ordering instructions, is included following the list of Tables.

√ 908

ABSTRACT

Accession Number:
@ 130.2
Battelle Pacific Northwest Laboratory, Feb. 1982, Oil shale and tar sands research: in Pacific Northwest Laboratory annual report for 1981 to the DOE Assistant Secretary for Environment, Part 4. Physical Sciences, Rep. PNL-4100, p. 77-88.

Contact: John Fruchter (copy)

Key Categories: EFFLUENTS, IN-SITU, SURFACE

Access Code: 011 Use Code: 02

This report is the Physical Sciences section of Battelle Pacific Northwest's Annual Progress report to the Department of Energy, Assistant Secretary for Environment. It summarizes research in environment, health, and safety conducted during fiscal year 1981. The oil shale and tar sands section summarizes the results of method development and characterization studies of oil shale byproducts, including gases, waters, oils, and solids. The report summarizes studies on organic and mutagenic properties of retort waters from the Paraho, Occidental, and Geokinetics processes, on polar organics and metallic complexes in shale oils and/or their water extracts, and on sulfur species in retort waters. Results of product and effluent characterizations for the tract C-a Rio Blanco Burn 0 are also reported.

✓ 909

ABSTRACT

Accession Number:
@ 130.3
Battelle Pacific Northwest Laboratory, Feb. 1982, Shale oil: in Pacific Northwest Laboratory annual report for 1981 to the DOE Assistant Secretary for Environment, Part 2. Ecological Sciences, Rep. PNL-4100.

Contact: Ray Wildung (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, SURFACE, LEACHING

Access Code: 000 Use Code: 01

√ 910

ABSTRACT

Accession Number:
@ 130.4
Battelle Pacific Northwest Laboratory, 1982, Solid waste from mining and surface retorts; Western oil shale development - a technology assessment: Rep. PNL-3830, v. 4, (UC-11), 61 p.

Contact: Ray Wildung (copy)

Key Categories: SURFACE, LEACHING

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 131
Battelle Pacific Northwest Laboratory, 1981, Western oil shale development- a technology assessment: Executive Summary and v. I - main report, Rep. PNL-3830.

Contact: George Rotariu (copy)

Key Categories: ENVIRONMENTAL, COLORADO, UTAH

Access Code: 011 Use Code: 02

This report evaluates the potential environmental, health and socioeconomic consequences of surface and in situ oil shale retorting. The report consists of nine separate volumes. Volume 1, Main Report, summarizes and interprets the results of separate, supporting studies on air quality, solid waste, ground water, surface water, ecology and agriculture, health and safety, and socioeconomics and reviews relevant literature in each area. The analyses in the supporting studies are based on 300,000 barrels per day of production by 1990 from a mix of surface and in situ processes.

911

ABSTRACT

Accession Number:
@ 131.1
Battelle Pacific Northwest Laboratory, Feb. 1981, Oil shale and tar sands research: in Pacific Northwest Laboratory annual report for 1980 to the DOE Assistant Secretary for Environment, Part 4. Physical Sciences, Rep. PNL-3700, p. 113-127.

Contact: John Fruchter (copy)

Key Categories: SURFACE, EFFLUENTS, IN-SITU

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 132
Battelle Pacific Northwest Laboratory, Feb. 1981, Shale oil: in Pacific Northwest Laboratory annual report for 1980 to the DOE Assistant Secretary for Environment, Part 2. Ecological Sciences, Rep. PNL-3700 PT 2, p. 43-46.

Contact: Ray Wildung (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY, GROUNDWATER QUALITY, SURFACE, LEACHING

Access Code: 011 Use Code: 01

This report is the Ecological Sciences section of Battelle Pacific Northwest's 1980 annual progress report to the Department of Energy. The specific studies reported in the section on oil shale are directed at understanding soil biochemical transformations impacting human food chains and the viability of green plants. The objectives of the reported work are to develop basic knowledge on the form, mobility, stability, and plant availability and toxicity of residuals in retort waters and spent shales, to model the movement of organic residuals in soil and spent shale, and to develop methods to restore disturbed lands. This report summarizes results of field studies at the Anvil Points facility and at tract C-a. Leachates have been collected over a four-year period from lysimeters at Anvil Points, Colorado, and analyzed for major cations, anions, trace elements, and dissolved organic carbon. These studies indicate that chemical equilibrium between water and the disposed spent shale is a slow process. Trace elements that were elevated in spent shale leachates include Li, Mo, F, and As. The macroions Na, K, CA, Mg, and Cl as well as SO_4 and S_2O_3 were also elevated. Preliminary results are reported of a study at Anvil Points to determine the effect of a fire in the raw shale fines pile on water quality. An overview of a baseline study, in progress at tract C-a, is also present.

√ 912

ABSTRACT

Accession Number:
@ 132.1
Battelle Pacific Northwest Laboratory, Feb. 1980, Shale oil: in Pacific Northwest Laboratory annual report for 1979 to the DOE Assistant Secretary for Environment, Part 2. Ecological Sciences, Rep. PNL-3300, p. 33-39.

Contact: Ray Wildung (copy)

Key Categories: COLORADO, ENVIRONMENTAL, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, LEACHING, SURFACE, IN-SITU

Access Code: 011 Use Code: 01

This report is the Ecological Sciences section of Battelle Pacific Northwest's 1979 annual progress report to the Department of Energy. The specific studies reported in the section on oil shale are directed at understanding soil biochemical transformations impacting human food chains and the viability of green plants. The objectives of the reported work are to develop basic knowledge on the form, mobility, stability, and plant availability and toxicity of residuals in retort waters and spent shales, to model the movement of organic residuals in soil and spent shale, and to develop methods to restore disturbed lands. This report summarizes results of field studies at the Anvil Points site, of laboratory leaching studies using spent shales from Occidental's retort 3E and of microbiological and plant studies. The field studies are evaluating the impact of the oil shale facility at Anvil Points, Colorado, on surface water and ground water quality. Surface and ground waters from points above and below the facility are analyzed for organic and inorganic constituents. Preliminary results indicate that Li concentrations are elevated and suggest that this parameter may be a good environmental tracer for oil shale related contamination.

913

ABSTRACT

Accession Number:
@ 132.2
Battelle Pacific Northwest Laboratory, Feb. 1980, Oil shale and tar sand research: in Pacific Northwest Laboratory annual report for 1979 to the DOE Assistant Secretary for Environment, Part 4. Physical Sciences, Rep. PNL-3300, p. 101-113.

Contact: John Fruchter (copy)

Key Categories: EFFLUENTS, SURFACE, IN-SITU

Access Code: 011　　Use Code: 02

This report is the Physical Sciences section of Battelle Pacific Northwest's Annual Progress report to the Department of Energy, Assistant Secretary for Environment. It summarizes research in environment, health, and safety conducted during fiscal year 1979. The oil shale and tar sands section summarizes the results of method development and characterization studies of oil shale byproducts, including gases, waters, oils, and solids. The report presents trace element analyses of groundwaters at Occidental's Logan Wash site, of retort waters and shale oils from the Geokinetics and Occidental in-situ processes and the Paraho surface process. It also presents trace element analyses of spent shale cores from Occidental Retort 3E and fractionation and mutagenicity tests on several shale oils.

914

ABSTRACT

Accession Number:
@ 132.3

Battelle Pacific Northwest Laboratory, Feb. 1979, Oil shale and tar sands research: in Pacific Northwest Laboratory annual report for 1978 to the DOE Assistant Secretary for Environment, Part 4. Physical Sciences, Rep. PNL-2850, PT4, p. 4.1-4.13.

Contact: John Fruchter (copy)

Key Categories: EFFLUENTS, SURFACE, IN-SITU

Access Code: 011 Use Code: 02

This report is the Physical Sciences section of Battelle Pacific Northwest's Annual Progress report to the Department of Energy, Assistant Secretary for Environment. It summarizes research in environment, health, and safety conducted during fiscal year 1978. The oil shale and tar sands section summarizes the results of method development and characterization studies of oil shale byproducts, including gases, waters, oils, and solids. The report summarizes studies on organic analyses of Paraho effluents and shale oil and on instrumental analysis of a number of trace elements in Paraho oils and waters. Mercury and sulfur speciation studies in product gases from the Paraho Semiworks retort are discussed, and elemental mass balances for AL, As, Hg, Se, Zn, and other elements are presented. The results of a study to accurately measure As in process waters is reported.

✓ 915

ABSTRACT

Accession Number:
@ 132.4
Battelle Pacific Northwest Laboratory, Feb. 1979, Shale oil: in Pacific Northwest Laboratory Annual Report for 1978 to the DOE Assistant Secretary for Environment, Part 2, Ecological Sciences: Rep. PNL-2850, PT 4, p. 2.1-2.8.

Contact: Ray Wildung (copy)

Key Categories: EFFLUENTS, SURFACE, LEACHING

Access Code: 011 Use Code: 02

This report is the Ecological Sciences section of Battelle Pacific Northwest's 1979 annual progress report to the Department of Energy. The specific studies reported in the section on oil shale are directed at understanding soil biochemical transformations impacting human food chains and the viability of green plants. The objectives of the reported work are to develop basic knowledge on the form, mobility, stability, and plant availability anmd toxicity of residuals in retort waters and spent shales, to model the movement of organic residuals in soil and spent shale, and to develop methods to restore disturbed lands. This report summarizes studies on the organic composition of Paraho retort water, on field and laboratory leaching studies, on microbial colonization of spent shale, and on physiological effects of retort water.

916

ABSTRACT

Accession Number:
@ 132.5
Battelle Pacific Northwest Laboratory, Feb. 1978, Shale oil: in
Pacific Northwest Laboratory annual report for 1977 to the DOE
Assistant Secretary for Environment, Part 2. Ecological Sciences,
Rep. PNL-2500 PT 2, P. 6.1-6.15.

Contact: Ray Wildung (copy)

Key Categories: EFFLUENTS, SURFACE, IN-SITU, LEACHING

Access Code: 011 Use Code: 02

This report is the Ecological Sciences section of Battelle Pacific Northwest's 1977 Annual Progress report to the Department of Energy. The specific studies reported in the section on oil shale are directed at understanding soil biochemical transformations impacting human food chains and the viability of green plants. The objectives of the reported work are to develop basic knowledge on the form, mobility, stability, and plant availability and toxicity of residuals in retort waters and spent shales, to model the movement of organic residuals in soil and spent shale, and to develop methods to restore disturbed lands. This report summarizes organic and inorganic analyses of a simulated in-situ and two Paraho process waters, concentrations of saturate and aromatic hydrocarbons in a shale oil, and preliminary results of Paraho spent shale and leachate characterizations. Initial results from studies on microbial colonization of spent shale and on microbial degradation of organics in retort waters are also presented, and experiments on the physiological effects of retort water on plant growth are summarized.

917

ABSTRACT

Accession Number:
@ 132.6
Battelle Pacific Northwest Laboratory, Feb. 1978, Oil shale and tar sands research: in Pacific Northwest Laboratory annual report for 1977 to the DOE Assistant Secretary for Environment, Part 4. Physical Sciences, Rep. PNL-2500, PT4, p. 4.0-4.9.

Contact: John Fruchter (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 000 Use Code: 03

√ 918

ABSTRACT

Accession Number:
@ 132.7
Battelle Pacific Northwest Laboratory, May 1977, Shale oil: in Pacific Northwest Laboratory annual report for 1976 to the ERDA Assistant Administrator for Environment and Safety, Part 2. Ecological Sciences, Rep. BNWL-2100 PT2, p. 2.1-2.11.

Contact: Ray Wildung (copy)

Key Categories: EFFLUENTS, IN-SITU, COMPUTER MODELS

Access Code: 011 Use Code: 02

This report is the Ecological Sciences section of Battelle Pacific Northwest's 1976 annual progress report to the Department of Energy (formerly ERDA). The specific studies reported in the section on oil shale are directed at understanding soil biochemical transformations impacting human food chains and the viability of green plants. The objectives of the reported work are to develop basic knowledge on the form, mobility, stability, and plant availability and toxicity of residuals in retort waters and spent shales; to model the movement of organic residuals in soil and spent shale, and to develop methods to restore disturbed lands. This report summarizes studies on organic analyses of a simulated in-situ shale oil and retort water and on preliminary laboratory studies on adsorption of collidine on a soil and spent shale. This latter work is directed at developing a computer model that describes the transport of organic compounds through spent shale and soil-spent shale systems.

✓ 919

ABSTRACT

Accession Number:
@ 132.8
Bauer, D.P., 1981, Effects of energy development on the stream-water resources of the White River basin, Colorado and Utah: in Water-resources investigations of the U.S. Geological Survey in Colorado - fiscal year 1981, U.S. Geological Survey Open-File Report 81-150, p. 125.

Contact: Danny Bauer (status)

Kay Categories: COLORADO, ENVIRONMENTAL, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

The purpose of this program is to describe the hydrology of the White River basin and to evaluate the potential effects of energy development on it. Available quality and quantity information will be compiled and a water quality reconnaisance program will be conducted at about 50 sites. Gains and losses of streams will be determined to evaluate the interchange of water between alluvial aquifers and surface waters. The composition and geometry of alluvial aquifers will be tested. Waste-load assimilative capacities of selected stream reaches will be evaluated. The effects of several different reservoir-development schemes on streamflows will be simulated.

ABSTRACT

Accession Number:
@ 133
Bauer, D.P., Rathbun, R.E., and Lowham, H.W., 1979, Traveltime, unit-concentration, longitudinal-dispersion, and reaeration characteristics of upstream reaches of the Yampa and Little Snake Rivers, Colorado and Wyoming: U.S. Geological Survey Water-Resources Investigations 78-122, 66 p.

Contact: Public Inquiries Office (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, COMPUTER MODELS

Access Code: 011 Use Code: 01

Two traveltime, unit-concentration, and dispersion analyses were made along a 58-mile reach of the Yampa River in Colorado when the average streamflow was approximately 100 and 3,400 cubic feet per second; three traveltime, unit-concentration, and dispersion analyses were made along a 72 mile reach of the Little Snake River in Wyoming and Colorado when the average streamflow was approximately 200, 600, and 1,600 cubic feet per second. Reaeration coefficients also were determined for the Yampa River reach when the average streamflow was approximately 100 cubic feet per second.

Traveltime and unit-concentration simulations were made using a mathematical model. Data collected for the Little Snake River when the average streamflow was approximately 600 cubic feet per second were used as a check of model-simulation accuracy. Traveltime simulations compared to within 5 percent, and unit-concentration simulations were within 30 to 40 percent of the measured flow data. Longitudinal-dispersion coefficients ranged from 400 to 6,050 square feet per second for the two streams. Reaeration coefficients for the Yampa River, adjusted to 20 degrees Celsius, ranged from 6.04 to 33.4 day^{-1}.

ABSTRACT

Accession Number:
@ 134
Beck, R.W. and Associates, Jan. 1982, Una Reservoir project feasibility study, draft plan of study: report prepared for Colorado Water Conservation Board, Denver, Colorado.

Contact: Dan Law (copy)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN

Access Code: 011 Use Code: 02

The proposed Una Reservoir will be situated on the mainstem of the Colorado River. The dam site will be located about 3 miles northeast of DeBeque and the reservoir would extend upstream to the vicinity of Parachute Creek. It is anticipated that the most likely use of water developed at this reservoir is for energy industries including oil shale development, coal gasification, thermal powerplants, and coal mining.

This report is a plan of study to assess the feasibility of the Una Reservoir Project. It was prepared to provide the Colorado Water Conservation Board with the administrative and technical procedures and criteria that will be used to carry out this work. The document consists of a series of work tasks developed to appraise the various features of the Project, a methodology for completing each task, a time schedule, and an estimate of labor and cost by task. A general description of the project is also provided. The technical work to be completed includes: (1) compilation and review of existing data; (2) site inspection; (3) analysis of flood hydrology and sedimentation; (4) water rights evaluations and storable water analysis; (5) operation studies for water yield and power generation; and (6) potential uses of water.

ABSTRACT

Accession Number:
@ 135
Becker, C.F., and Alyea, J.D., June 1964, Temperature probabilities in Wyoming: Agricultural Experiment Station, University of Wyoming, Bulletin 416, 157 p.

Contact: BLM - Cheyenne (loan)

Key Categories: WYOMING, CLIMATE

Access Code: 152 Use Code: 02

This report presents complete temperature probability analyses for 22 stations and extreme, mean maximum, mean minimum and mean monthly temperatures for 57 stations. None of these stations are within the boundaries of the Wyoming oil shale basins. However, several (Green River - probabilities; Rock Springs, Wamsutter, Dixon - ranges) are close enough to the boundaries to be useful.

Appendices present graphs of probabilities of minimum and maximum temperatures, monthly means, and extreme temperatures for each station. Tables of empirical probabilities of observing maximum temperatures less than or equal to specified values are also presented for each station.

✓ 920

ABSTRACT

Accession Number:
@ 135.1
Becker, C.F., and Alyea, J.D., June 1964, Precipitation probabilities in Wyoming: Agricultural Experiment Station, University of Wyoming, Bulletin 415, 97 p.

Contact: BLM - Cheyenne (loan)

Key Categories: WYOMING, CLIMATE

Access Code: 152 Use Code: 02

This report presents precipitation probabilities for 22 stations and average monthly and annual precipitation for 73 stations. None of these stations are within the boundaries of the Wyoming oil shale basins. However, several (Green River - probabilities; Green River, Rock Springs, Wamsutter, Dixon - precipitation averages) are close enough to the boundaries to be useful.

Appendices present the chances of receiving certain amounts of precipitation during one-, two- and three-week periods beginning each week of the climatological year in tables and graphs. The graphs for the Green River station show the percent chance of receiving none or a trace of and at least 0.2 and 0.4 inches in a one-week period; at least 0.4, 0.8 and 1.2 inches in a two-week period; and at least 0.8, 1.2 and 1.6 inches of precipitation in a three-week period for each of the 12 months. The probability tables for the Green River station show the percent probability of receiving trace or less and at least 0.06, 0.10, 0.20, 0.40, 0.60, 0.80, 1.00, 1.40, 2.00 and 4.00 inches during one-, two- and three-week periods. Another table presents monthly and average annual precipitation in inches for 73 stations, together with location and elevation of the stations.

ABSTRACT

Accession Number:
@ 136
Bentley, R.G., Jr., Eggleston, K.O., and Jones, E.B., 1980, Control of salinity from point sources yielding groundwater discharge and from diffuse surface runoff in the Upper Colorado River basin - 1978-79 status report: Bureau of Land Management Rep. BLM/YA/TR-80/01, 37 p.

Contact: BLM - Denver Service Center (copy)

Key Categories: UTAH, COLORADO, WYOMING, SALINITY, SURFACE WATER QUALITY

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 137
Bentley, R.G., Jr., Eggleston, K.O., Price, D., Frandsen, E.R., and Dickerman, A.R., Feb. 1978, The effects of surface disturbance (primarily livestock use) on the salinity of public lands in the Upper Colorado River basin - 1977 status report: Bureau of Land Management Rep. BLM/YA/TR-78/01, 180 p. plus appendices.

Contact: BLM - Denver Service Center (copy)
DRI (loan)

Key Categories: UTAH, COLORADO, WYOMING, SALINITY, SURFACE WATER QUALITY

Access Code: 011 Use Code: 02

The prospect of increasing salinity in the Colorado River, resulting from greater use of water (agriculture and industry) and soil disturbance (livestock grazing and mineral and energy development), has prompted the Department of The Interior to study possible means of reducing salt yields from diffuse and point sources. The Bureau of Land Management, in this report, discusses the mechanisms involved in salt pickup and transport from diffuse sources on public lands, primarily from overland flow of water. The effects of common man-caused soil disturbance, primarily livestock grazing, on salt yields are discussed. Any practice which compacts or disturbs soil, reduces infiltration, and increases runoff and erosion on saline soils, will increase salt yields. Several common practices, designed primarily to reduce erosion, were analyzed to determine their ability to control salt. The most promising alternative practices were subjected to benefit-cost analysis to determine their economic feasibility. The effects of salinity control practices on regional economies were also studied.

921

ABSTRACT

Accession Number:
@ 137.1
Bergman, H.L., Jan. 1980, Effects of aqueous effluents from in-situ fossil fuel processing technologies on aquatic systems: Rep. DOE/LETC/10058-T1, 121 p.

Contact: Harold Bergman (copy)

Key Categories: EFFLUENTS, SURFACE, IN-SITU, LEACHING

Access Code: 011 Use Code: 02

This is the third annual progress report for a continuing EPA-DOE project to evaluate the effects of aqueous effluents from in situ fossil-fuel technologies on aquatic biota. This report compiles water quality data for effluents (retort water, gas condensate, leachates) from the Paraho, Geokinetics, and Occidental processes. It also summarizes the results of 96-hr flow-through toxicity bioassays using fathead minnows and rainbow trout and 48-hr flow-through bioassays with _Daphnia pulicaria_. This information was used to compute estimated safe concentrations for each process water. Results are also presented of studies on the biodegradation of solutes in these process waters and on bioaccumulation.

✓ 922

ABSTRACT

Accession Number:
@ 137.2
Bergman, H.L., and Meyer, J.S., March 1982, Aquatic ecosystem effects of process waters produced by synthetic fuel technologies: draft report submitted to the U.S. EPA by University of Wyoming, 51 p.

Contact: Harold Bergman (copy)

Key Categories: SURFACE, IN-SITU, LEACHING, EFFLUENTS

Access Code: 011 Use Code: 01

Acute toxicity tests with Daphnia magna and fathead minnows have been compiled for 44 synfuel-related waters, including: (1) untreated and treated oil shale mine sump waters; (2) raw oil shale leachates; and (3) untreated and treated oil shale process waters. Additionally, several rainbow trout acute toxicity tests, Daphnia magna limited-chronic toxicity tests, and algal growth inhibition studies were performed.

Treated mine sump waters from Federal Oil Shale Lease Tract C-b are not acutely toxic and are probably not adversely affecting aquatic biota in Piceance Creek, the discharge receiving stream. Raw oil shale leachates from Tract C-b also appear to have minimal aquatic toxicity and would probably not adversely affect aquatic biota during an accidental spill into a receiving stream.

However, raw oil shale leachates from Federal Lease Tract C-a are acutely toxic to Daphnia at approximately 10% leachate. Much of the toxicity appears to be caused by high salinity producing osmotic stress. These leachates will probably have to either be retained and used on site or treated before discharge.

Although untreated oil shale process waters are extremely toxic, treatment processes including stream stripping, bacterial fermentation and activitated carbon filtering considerably reduce this toxicity. Based on acute toxicity tests for a treated retorting gas condensate, it appears that treated oil shale process waters may be environmentally acceptable for intermittent or continuous discharge to receiving streams. However, additional limited-chronic toxicity tests must be conducted before this preliminary conclusion is confirmed.

923

ABSTRACT

Accession Number:
@ 137.3
Bergman, H.L., DeGraeve, G.M., Anderson, A.D., and Farrier, D.S., July 1979, Effects of complex effluents from in-situ fossil fuel processing on aquatic biota: in Proceedings of the Symposium on potential health and environmental effects of synthetic fossil fuel technologies, U.S. DOE Rep. CONF-780903, p. 204-211.

Contact: Harold Bergman (copy)

Key Categories: IN-SITU, EFFLUENTS

Access Code: 011

Use Code: 02

In situ processes for advanced fossil fuel recovery elicit major concerns about contamination of surface and groundwater with potential effects on water uses and aquatic biota. Acute and limited-chronic toxicity bioassays were conducted to determine the effect of process waters produced from two in situ technologies being developed by DOE's Laramie Energy Technology Center: (1) Omega-9 retort water from the Rock Springs Site 9 in situ oil shale processing experiment; and (2) Hanna-3 condenser water from the Hanna underground coal gasification experiments. The acute TL_{50} dilution (50% toxicity level) for oil shale retort water was about 0.5% for rainbow trout and fathead minnows (96-h) and Daphnia pulex (48-h), and the threshold effect dilutions for limited-chronic bioassays with rainbow trout were 0.3% for egg hatchability and 0.1% for fry growth; the principal solutes affecting the acute toxicity were probably inorganic. The acute TL_{50} dilution for underground coal gasification condenser water was about 0.1% for rainbow trout and fathead minnows (96-h) and 0.2% for Daphnia pulex (48-h), while the threshold effect dilutions for limited-chronic bioassays with fathead minnows were 0.04% for egg hatchability and 0.02% for fry growth; the principal solutes influencing acute toxicity were probably phenolics and ammonia. Possible groundwater contamination is a critical concern with in situ technologies, and studies are continuing on chemical characterization and aquatic toxicity of these process waters.

ABSTRACT

Accession Number:
@ 138
Berwick, V.K., 1962, Floods in Utah, magnitude and frequency: U.S. Geological Survey Circular 457, 24 p.

Contact: USGS - Salt Lake City (copy)

Key Categories: UTAH, FLOODS

Access Code: 011 Use Code: 02

This report presents a procedure for estimating the magnitude and frequency of floods, within the range of the base data, for any site, gaged or ungaged. From the relation of annual floods to the mean annual flood, a composite frequency curve was derived for recurrence intervals of 1.1 to 50 years. For regions of similar hydrologic characteristics, curves were developed by multiple correlation to express the relation of mean annual flood to drainage area and mean altitude. The records of gaging stations having 5 or more years of record were used as base data when the natural conditions of stream-flow are not affected by works of man. For major rivers where the flow is affected by diversion or regulation, separate analyses were made for each stream. The results may be applied to any area in Utah, except the Great Salt Lake Desert and a small area of the State in the Snake River basin.

924

ABSTRACT

Accession Number:
@ 138.1
Bessler, M.B., 1975, Salinity impacts of energy development in Utah: in Impacts of energy development on Utah water resources, Third Annual Conference of the Utah Section of the Am. Water Res. Assoc., p. 31-49.

Contact: Utah Water Research Laboratory (copy)

Key Categories: UTAH, SALINITY

Access Code: 011 Use Code: 02

Salinity control legislation and control programs are discussed with emphasis on specific features in Utah. The cumulative salinity impacts of select energy development sites in Utah are quantified for comparative purposes. Finally, the use of degraded quality water for energy development is advocated in order to minimize impacts on salinity and remaining fresh water supplies.

The report summarizes several projections of TDS at Imperial Dam, tabulates the expected impact on TDS concentrations of various proposed salinity control plans, and tabulates various proposed energy development, plant capacities, and water requirements. The impact of these various developments on TDS at Imperial Dam is estimated.

✓ 925

ABSTRACT

Accession Number:
@ 138.2
Bessler, M.B., and Maletic, J.T., May 1975, Salinity control and the Federal Water Quality Act: Journal of the Hydraulics Division, Proceedings of ASCE, v. 101, no. HY5, p. 581-594.

Contact: Denver Public Library (loan)

Key Categories: SALINITY, COLORADO, WYOMING, UTAH, WATER LAW

Access Code: 002 Use Code: 03

Salinity is considered as a chemical or mineral pollutant under the Federal Water Quality Act and is receiving increased attention in the western U.S. Salinity and the adequency of basin water supplies is becoming a major economic issue in the Colorado River basin. The overall planning strategy of the Colorado River water quality improvement program (CRWQIP) and some of its inherent limitations in meeting water quality goals are discussed. The Colorado River International Salinity Control Project is a comprehensive effort which demonstrates that salinity control planning must consider many complex interrelated factors from natural hydrologic variations and man-made changes to international relations and legislation reflecting public policy. The five categories of control that are presently being studied under the CRWQIP include: River system management; point source control; diffuse source control; irrigation source control; and, return flow utilization. If full water resource development is attained, then the point and diffuse source controls as identified in the CRWQIP will not be sufficient to meet salinity objectives established by the states and the EPA. Planning will be directed toward a total water management concept which involves the following: integrating water resources management and land-use planning; planning and controlling of interrelated structures and physical features; examining and evaluating the existing systems, institutions, and legal requirements; displaying alternative plans to examine quality and quantity impacts within a river basin; and, deriving efficient operational and management modes for the river system.

ABSTRACT

Accession Number:
@ 139
Bethea, R.M., Parker, H.W., and Güven, N., 1981, Mechanisms of leaching from in situ retorted oil shale: final report for grant DE-FG03-78ET13084 submitted to Laramie Energy Technology Center by Texas Tech. University, Lubbock, Texas, 401 p.

Contact: Dick Poulson (copy)

Key Categories: LEACHING, IN-SITU

Access Code: 011 Use Code: 03

This report summarizes the results of a laboratory investigation of the mechanisms of leaching of in-situ spent shale. Experiments were conducted on the effect of retorting conditions on leachate quality and on high temperature mineral reactions which occur during retorting. Raw shales from the Rifle mine and from Utah were retorted at temperatures ranging from 430 to 780° C in the presence and absence of air and batch leached with deionized water and groundwater for varying times. The use of bentonite was investigated for pH control during leaching. Permeability of the leached cores was measured and found to decrease by over an order of magnitude within 2 hours. Growth of fibrous material was noted in the pores and cracks of the cores.

ABSTRACT

Accession Number:
@ 140
Biesecker, J.E., Saulnier, G.J., Jr., and Robson, S.G., April 1978, Impact of oil-shale development on the ground water of Piceance basin, Colorado: in Symposium on Energy/Ground Water Issues (abs.): American Society of Civil Engineers Spring Convention Program, Pittsburgh, Pennsylvania.

Contact: USGS Library (loan)

Key Categories: GROUNDWATER QUANTITY, COLORADO, GROUNDWATER QUALITY, ENVIRONMENTAL

Access Code: 011 Use Code: 01

This paper discusses groundwater quality and quantity of the Piceance Basin, Colorado, and it overviews work published elsewhere on the impacts of site dewatering on local hydrology (see Abstract Nos. 824 and 709).

The report concludes that mine dewatering will have a significant effect on the water resources of the Piceance basin. It could cause potentiometric heads in a 250-square-mile area of the upper aquifer to decline more than 100 feet, thus eliminating groundwater discharge to springs and streams. Mine dewatering also might temporarily improve the quality of groundwater near the mines, but refilling abandoned in-situ retorts could degrade water quality in bedrock aquifers.

ABSTRACT

Accession Number:
@ 141
Birman, J., Jan. 4, 1982, An analysis of water movement in the Piceance basin: letter from J. Birman to P. Fox and others, 17 p.

Contact: Barbara Birman (copy)

Key Categories: COLORADO, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

In situ retorting in the Piceance Basin may lead to underground contamination from leaching of abandoned retorts and to a reduction in surface water flows from dewatering (Abstract Nos. 824, 576, 371). This paper presents arguments against the occurrence of these two impacts. The author argues that lateral groundwater migration within much of the Green River Formation is so slow as to be, in practical effect, non-moving; that away from through-going faults, the deep groundwater is not in significant communication with the near-surface water; that some of the water in the Green River Formation is ancient and is not being actively recharged now; and that the leaching of the Green River Formation may have been an ancient event, since which time through-going continuity of open space was destroyed.

ABSTRACT

Accession Number:
@ 142
Birman, B.E., and Schick, J.T., 1978, Preliminary hydrologic investigation of the TOSCO Corporaton Sand Wash area, Uintah County, Utah: report prepared by Geothermal Surveys, Inc., South Pasadena, CA for TOSCO Corp., Los Angeles, CA, 83 p. plus plate.

Contact: Barbara Birman (copy)

Key Categories: UTAH, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE

Access Code: 011 Use Code: 02

This report presents the results of a preliminary hydrologic investigation of the Sand Wash area in Uintah County, Utah. The investigation includes a literature search on the hydrogeologic setting of the Unita Basin and a field reconnaissance of the Sand Wash area.

A water balance equation is developed for the Sand Wash site, and the available surface water hydrology data are reviewed and interpreted in the framework of this balance to facilitate identificatio of data gaps. Existing information on precipitation, evapotranspiration surface runoff, and subsurface outlfow are reviewed, and the location of NOAA and USGS precipitation stations within Uintah County are shown on maps. Isohyetal maps of average annual precipitation are provided. The literature on geohydrology and surface water quality is also reviewed.

926

ABSTRACT

Accession Number:
@ 142.1
Bishop, A.B., Oct. 1977, Impact of energy development on Colorado River quality: Natural Resources Journal, v. 17, no. 4, p. 649-671.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 02

Energy development in the Colorado River Basin has created a broad range of potential water quality problems. Point source pollution is controllable by current water quality laws, such as Public Law 92-500. Related activities, land surface disturbance, air emissions, mining operations, and water withdrawals could also affect water quality. These activities are not as easily controlled. Mexico and the United States consider salinity the chief water quality problem. The future development of compact-apportioned waters in the basin has been analyzed through water and salt mass balance model studies. Total dissolved solid concentrations are seen to increase below Imperial Dam. Thus, by taking water that serves for dilution out of the river, salinity concentrations are more highly affected. Salinity impact from energy development is reduced due to the control strategy of no salt return in the form of highly concentrated brines. The Colorado River regional assessment study has estimated this reduction to be on the order of 34 mg/l; the Salinity Forum considered the reduction to be 27 mg/l. When formulating programs designed to meet water quantity and quality committments to Mexico, these effects must be considered.

√ 927

ABSTRACT

Accession Number:
@ 142.2
Bishop, A.B., Klemetson, S.L., Torpy, M.F., and McKee, M., Jan. 1979, Energy development vs. water quality in the Upper Colorado and Upper Missouri River basins: Los Alamos Scientific Laboratory Rep. LA-7574-MS, 183 p.

Contact: Mike Torpy (copy)

Key Categories: SURFACE WATER QUALITY, WATER LAW, PROCESS WATER USE, SURFACE, COLORADO, WYOMING, UTAH

Access Code: 011 Use Code: 02

This report examines the relationship between energy development and water quality in the Upper Colorado and Upper Missouri River Basins. In order to provide a background for problem assessment, the general physiographic, water resources, and water quality setting is described for each of the basins. The locations and types of energy resources and present and possible future developments are also identified relative to the water resource systems. The water quality problems and impacts from energy developments are discussed in terms of the various pollutants generated by energy extraction and processing activities, and the pollution transport mechanisms and pathways by which they can enter surface water and groundwater. Looking at the problem from another perspective, the report discusses the implications for energy development of the water quality aspects of legislative requirements and regulations. These include the Federal Water Pollution Control Act Amendments, the Safe Drinking Water Act, the Surface Mining Control and Reclamation Act, the Resource Conservation and Recovery Act, and the Toxic Substances Control Act.

ABSTRACT

Accession Number:
@ 143
Bishop, A.B., Chambers, M.D., Mace, W.O. and Mills, D.W., June 1975,
Water as a factor in energy resources development: Utah Water
Research Laboratory publicaton PRJER028-1, 104 p.

Contact: NTIS (copy)
Utah State University Library (loan)

Key Categories: UTAH, COMPUTER MODELS, PRESENT WATER USE

Access Code: 002 Use Code: 02

An application is made to the energy resource region within the Utah portion of the Colorado River basin. Surface water resources available by stream reaches are designated, and the possible energy developments requiring water inputs, for both extraction and conversion processes, are located. For the initial application of the model, optimal solutions were obtained for both energy maximization and water minimization which illustrate composite system effects and potential conflicts that could arise from various combinations of water allocation to energy resources developments.

✓ 928

ABSTRACT

Accession Number:
@ 143.1
Bishop, F.A., 1974, Industrial water availability: Western states opportunities and problems, in Proceedings of the synthetic hydrocarbons conferences, New York, American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc., p. 81-83.

Contact: none

Key Categories: WYOMING, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 002 Use Code: 03

Wyoming's massive energy resources, coupled with the developing energy crisis, have focused national attention on the state, which ranks second in uranium reserves, fifth in crude oil, seventh in natural gas, and ninth in coal. The pressures of the worldwide energy crisis will inevitably lead to rapid expansion in the development and production of these fuels.

Wyoming's major industrial growth appears to lie in the field of coal and oil-shale development. Generally speaking, the oil-shale reserves are located in the drainage of the Colorado River in the southwestern part of the state, and in an area of water surplus for Wyoming. Although there are many unknowns concerning the water requirements of an oil shale industry, it would appear that adequate water should be available to supply demands in this area of Wyoming.

The picture concerning coal development is not nearly so clear. The availability of water will be a critical factor in determining the extent of coal development in northeastern Wyoming. If adequate water becomes available, there will be significant industrial development, including coal-fired electrical generating plants and various kinds of synthetic fuel production plants located near the coal deposits. If water is not available, the coal will probably be mined and shipped out of the area.

ABSTRACT

Accession Number:
@ 144
Blackman, W.C., Jr., Rouse, J.V., Schillinger, G.R., and Shafer, W.H., Jr., 1973, Mineral pollution of the Colorado River basin: Journal of the Water Pollution Control Federation, v. 45, p. 1517-1557.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY

Access Code: 002 Use Code: 02

Concentrations of total dissolved solids (salinity) in Colorado River basin streams are a major problem for lower basin water users. Salinity concentrations in unregulated streams of the basin comprise two distinct populations that are grouped into base flow months and runoff months. Statistically significant increases in salinity have occurred with increasing water use, and in downstream progression. Upper basin salt load contributions are: runoff, 52 percent; irrigated agriculture, 37 percent; natural point sources and flowing wells, 9 percent; and municipal and industrial, 7 percent. Lower basin contributors are: Upper basin inflow, 72 percent; natural point sources, 15 percent; irrigated agriculture, 9 percent; runoff, 4 percent, and municipal and industrial, less than 1 percent. Salt yields from irrigated lands range from near 0 to 8.5 tons/yr/acre. Greatest yields are from irrigation of and runoff from lands underlain by Mancos shale and tertiary lake beds. Headwater areas yield predominantly calcium bicarbonate waters. Saline sediments in lower valleys cause waters to become predominantly high in sodium calcium sulfate ions.

929

ABSTRACT

Accession Number:
@ 144.1
Blanc, F.C., O'Shaughnessy, J.C., Wei, I.W., and MacNevin, P.E., May 1980, In-situ shale oil retort wastewater pretreatment using coagulation and oxidation: 35th Annual Purdue Industrial Waste Conference Proceedings, Purdue University, West Lafayette, Indiana, 21 p.

Contact: Fred Blanc (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

This paper summarizes research on pre-biological treatment of in situ retort water. Two alternative pretreatment processes were evaluated: chemical coagulation with sedimentation or floatation and chemical oxidation. The purpose of pretreatment was to achieve significant removal of suspended solids and chemical oxygen demand and to modify the waste characteristics to improve the biological treatability of the water.

These studies revealed that chemical coagulation removes only emulsified oils and suspended solids; COD and BOD removal was associated with these materials. Coagulation with $FeCl_3$, alum, or lime produced large amounts of chemical sludge. Emulsion breakers were found to be the most effective chemical pretreatment.

930

ABSTRACT

Accession Number:
@ 144.2
Bliesner, R.D., Hanks, R.J., King, L.G., and Willardson, L.S., March-April 1977, Effect of irrigation management on the quality of irrigation return flow in Ashley Valley, Utah: Soil Science of America Journal, v. 41, no. 2, p. 424-428.

Contact: Denver Public Library (loan)

Key Categories: UTAH, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

A study was conducted to evaluate reduced leaching fractions under different field water management conditions. Three qualities of water were applied at three leaching fractions to areas of an alfalfa (medicago sativa l.) field having three depths to the water table. A sprinkler irrigation system was used; with electrical conductivity of the irrigation water and soil solution extract at various depths measured for each application. Results indicate that soil profile salinity is relatively unaffected by leaching fraction for short periods of time (1 to 2 years), due to high relative concentrations of calcium and sulfate in the irrigation water and soil solution. The electrical conductivity of waters applied averaged 0.98, 2.22 and 2.80 mmhos/cm, respectively, for the season. Leaching fractions for the low leaching treatment of each water quality averaged 0.003 to 0.343. The total amount of salt removed in irrigation return flow from such an area varies directly with drainage water quantity since the concentration is relatively constant.

931

ABSTRACT

Accession Number:
@ 144.3

Bloch, M.B., and Kilburn, P.D., eds., 1973, Processed shale revegetation studies, 1965-1973: Colony Development Corporation Environmental Impact Assessment, sppendix No. 6, Colony Devleopment Operation, Denver, Colorado.

Contact: BLM - Craig (loan)
BLM - Vernal (loan)

Key Categories: SURFACE, RECLAMATION

Access Code: 000 Use Code: 02

932

ABSTRACT

Accession Number:
@ 144.4
Bloomfield, R.A., and Steward, B.M., 1981, Design parameters for oil shale waste disposal systems: Bureau of Mines Report of Investigations 8544, 38 p.

Contact: Roger Bloomfield (copy)

Key Categories: Surface, Reclamation

Access: 011 Use Code: 01

This report summarizes Bureau of Mines contract research on the disposal of retorted oil shale. A data base has been developed describing the physical-chemical properties, geotechnical engineering properties, and natural cementation characteristics of spent shale. Results of field compaction tests and seepage pond tests are presented, along with results of a partially saturated finite element seepage model used to predict infiltration and seepage rates. Preliminary engineering analyses are presented for underground disposal systems, which include material transport methods, and for a surface disposal system, which includes stability analyses.

ABSTRACT

Accession Number:
@ 145
Bloomsburg, G.L., and Wells, R.D., 1978, Seepage through partially saturated shale wastes: Final Report on Contract No. H0252065 submitted to Bureau of Mines by University of Idaho, Moscow, Idaho, 142 p.

Contact: NTIS (copy)

Key Categories: LEACHING, COMPUTER MODELS, COLORADO

Access Code: 011 Use Code: 01

This report describes work which was done to apply an existing finite element computer program UNSAT2 to the unsteady, unsaturated flow of water through waste shale piles. The work was done in three phases: verification of program through comparison with existing data; verification of program through simulation of flow from field seepage ponds at Rifle, CO.; and application of program to flow due to natural rainfall in a section through the Piceance Basin in Colorado, and a typical waste shale pile.

ABSTRACT

Accession Number:
@ 146
Boegli, W.J., and Dahl, M.M., 1981, Preliminary study of solar ponds for salinity control in the Colorado River basin: Bureau of Reclamation.

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, SALINITY

Access Code: 000 Use Code: 03

no 148

ABSTRACT

Accession Number:
@ 147
Boettcher, A.J., 1972, Ground-water occurrence in northern and central parts of Western Colorado: Colorado Water Conservation Board Water Resources Circular 15, 25 p. plus plates.

Contact: USGS Library (loan)

Key Categories: COLORADO, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, PRESENT WATER USE, SPRINGS

Access Code: 011 Use Code: 01

This report describes the ground-water resources of a 29,000-square-mile area in western Colorado. The area includes all or parts of 15 counties and is drained by the Colorado, Gunnison, White, Yampa, and Green Rivers. Topography varies from rugged mountain peaks rising to more than 14,000 feet above sea level in the east along the Continental Divide to flat mesas and valleys about 4,500 feet above sea level along the Colorado-Utah State line (fig. 1).

The report is based on a study which was begun in 1969 under a cooperative agreement between the U.S. Geological Survey and the Colorado River Water Conservation District. Fieldwork was completed in 1971.

The objectives of the study were to describe (1) the availability of ground water, (2) the chemical quality of ground water, (3) the extent of current ground-water use, and (4) the problems that are associated with managing and using ground water. Conclusions and statements made in the report are based on records of about 4,000 water wells, a few hundred oil or mineral exploratory holes, and on a few hundred chemical analyses of ground water. Other basic information includes geologic, land use, soils, and land status (ownership) maps. Reports that were used in the study are shown in the references at the end of the report.

ABSTRACT

Accession Number:
@ 149
Bolke, E.L., 1979, Dissolved-oxygen depletion and other effects of storing water in Flaming Gorge Reservoir, Wyoming and Utah: U.S. Geological Survey Water-Supply Paper 2058, 41 p.

Contact: Public Inquiries Office (copy)

Key Categories: SURFACE WATER QUALITY, WYOMING

Access Code: 011 Use Code 01

This is an interpretative report based on the data reported in Bolke, 1976 (Abstract No. 150). This report delineates the extent and frequency of occurrence of oxygen depletion in the reservoir, describes processes that control circulation in the reservoir, evaluates downstream effects of storing water in the reservoir, and evaluates potential effects of upstream development with regard to increased salinity.

ABSTRACT

Accession Number:
@ 150
Bolke, E.L., 1976, Chemical and physical data for the Flaming Gorge Reservoir area, Utah and Wyoming, 1973-75: U.S. Geological Survey, Open-File Report (duplicated as Utah Basic-Data Release No. 27), 35 p.

Contact: USGS - Salt Lake City (copy)

Key Categories: WYOMING, SURFACE WATER QUALITY

Access Code: 011 Use Code: 01

This report presents the basic data that were collected by the U.S. Geological Survey during a study of the chemical quality of water in Flaming Gorge Reservoir. The basic data was collected from the reservoir during the period August 1973 to October 1975. The reservoir was sampled for chemical and physical data at 25 sites. Measurements of temperature, specific conductance, dissolved oxygen, pH, SiO_2, Fe, Mn, Ca, Mg, Na, K, CO_3, HCO_3, SO_4, Cl, F, N forms PO_4, secchi disk, and others are reported.

ABSTRACT

Accession Number:
@ 151
Bolke, E.L., and Waddell, K.M., 1975, Chemical quality and temperature of water in Flaming Gorge Reservoir, Wyoming and Utah, and the effect of the reservoir on the Green River: U.S. Geological Survey Water-Supply Paper 2039-A, 26 p., plus 1 plate.

Contact: Public Inquiries Office (copy).

Key Categories: SURFACE WATER QUALITY, WYOMING, SURFACE WATER QUANTITY

Access Code: 011 · Use Code: 01

This is an interpretative report based on data reported in Bolke and Waddell, 1972 (Abstract No. 152). This report determines the rates of leaching of minerals in the reservoir area during 1969-72 and compares them with rates determined for 1963-68. It also discusses the effect of leached minerals on downstream quality and defines the annual limnologic cycle of the reservoir. The report describes the quality of water in the reservoir and its inflow and discusses inflow-outflow-storage relationships, leaching and chemical precipitation, and downstream effects of closure of the dam. A plate shows locations of data collection sites and profiles of temperature, dissolved oxygen, specific conductance, and pH.

ABSTRACT

Accession Number:
@ 152
Bolke, E.L., and Waddell, K.M., 1972, Water-quality data for the Flaming Gorge Reservoir area, Utah and Wyoming, 1969-72: U.S. Geological Survey Open-File Report (duplicated as Utah Basic-Data Release No. 24), 50 p.

Contact: USGS - Salt Lake City (copy)

Key Categories: SURFACE WATER QUALITY, WYOMING

Access Code: 011 Use Code: 01

This report presents the basic data that were collected by the U.S. Geological Survey during a study of the chemical quality of water in Flaming Gorge Reservoir. The basic data were collected from the reservoir during six sampling runs between October 1970 and September 1972. The reservoir was sampled for chemical analyses at 17 sites. Chemical and physical data were measured in situ at 34 sites. Measurements are reported for SiO_2, Ca, Mn, Fe, Mg, Na, K, HCO_3, CO_3, SO_4, Cl, F, NO_3, B, pH, and others.

ABSTRACT

Accession Number:
@ 153
Bolke, E.L., and others, 1977, Ground-water conditions in Utah, spring of 1977: Utah Dept. of Natural Resources, Cooperative-Investigations Report No. 16, 64 p.

Contact: Utah Division of Water Resources (copy)
USGS - Salt Lake City (copy)

Key Categories: UTAH, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 03

This is the fourteenth in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow.

The report includes individual discussions of selected major areas of groundwater withdrawals in the State for the calendar year 1976. Water-level fluctuations, however, are described for the period spring 1976 to spring 1977.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-76. Other information that encompasses the study area is combined with data from other parts of the State.

ABSTRACT

Accession Number:
@ 154
Bolke, E.L., and others, 1973, Ground-water conditions in Utah, spring of 1973: Utah Dept. of Natural Resources, Cooperative-Investigations Report No. 12, 101 p.

Contact: Utah Division of Water Resources (copy)
USGS - Salt Lake City (copy)

Key Categories: UTAH, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 03

This is the tenth in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow.

The report includes individual discussions of the most important areas of groundwater withdrawals in the State for the calendar year 1972 and for the 10-year period 1963-72. Water-level fluctuations, however, are described for the period spring 1972 to spring 1973 and spring 1963 and spring 1973.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-72. Other information that encompasses the study area is combined with data from other parts of the State.

✓ 933

ABSTRACT

Accession Number:
@ 154.1
Bonomo, F., 1974, Environmental effects of carbonaceous solid wastes from commercial oil shale operations: in Siggia, S., and Uden, P.C., eds., Proceedings of Conference on Analytical Chemistry Pertaining to Oil Shale and Shale Oil, p. 133-194.

Contact: NTIS (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 02

This conference paper describes and discusses research conducted during the first year on the NSF project, "Disposal and Environmental Impact of Carbonaceous Solid Waste from Commercial Oil Shale Operations." The purpose of this study was to determine the amount and kind of organic compounds in spent shale and process waters; to isolate and identify the structure and composition of compounds of known or suspected carcinogenic activity; and to investigate changes these compounds may undergo at large disposal sites and to investigate their impact on the environment by leaching or volatilization.

Samples of soil, water, vegetation, and air from various sites of potential oil shale development and of spent shales from pilot plant operations were collected and analyzed for their content of volatile organic and polycondensed aromatic compounds. This article summarizes the results of these characterizations in a number of tables and figures.

This preliminary work reveals that spent shales contain 0.02 and 0.2 percent benzene-soluble material which includes polycyclic aromatic hydrocarbons and aza-azarines. The amount of benzene-soluble material in spent shale is about one to two orders of magnitude higher than that found in soils from pristine areas, and is about one order of magnitude lower than that found in airborne particulate matter from industrial areas.

ABSTRACT

Accession Number:

@ 155

Bovee, K.D., and Milhous, R.T., 1978, Hydraulic simulation in instream flow studies, theory and techniques: Instream Flow Information Paper no. 5, Cooperative Instream Flow Service Group, U.S. Fish and Wildlife Service, Fort Collins, CO, 131 p.

Contact: Instream Flow and Aquatic Systems Group (copy)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 01

Hydraulic simulation for instream flow studies is defined as the description of the changes in distribution of velocities, depths, and substrates as a function of discharge. These changes are described in mathematical terms to facilitate the quantification of change of a dependent variable such as velocity with an incremental change in discharge. The type of hydraulic simulation technique appropriate for a certain situation depends on the degree of resolution required for the study, the characteristics of the stream, and the limitations inherent in the technique.

Several types of techniques for the prediction of the stage-discharge relationship and the velocity distribution-discharge relationship are presented. General limitation and site imposed constraints pertaining to each type of simulation technique are also presented.

The type of study site selected depends on the assumption that the study site is critical to the species under study, or that the study site is representative of a larger reach of stream. Either assumption may be implied or expressed in an instream flow methodology, and the study site reflects one of these assumptions. Study site preparation involves the strategic placement of transects which describe certain types of conditions or habitat areas within the channel. Further, the characteristics of the study site may have profound influences on one's ability to simulate the hydraulics of the stream.

Data requirements and precision specifications are provided, as well as guidelines for efficient data collection. Several appendices are included which detail data collection procedures for each type of data required for hydraulic simulation. The appendices also detail methods for collecting hydraulic data in large rivers, as well as equipment needed for such data collection. Finally, a brief description of several computer programs for hydraulic simulation is given in the appendices.

934

ABSTRACT

Accession Number:
@ 155.1
Bowden, C., Jan. 1975, The impact of energy development on water resources in arid lands; literature review and annotated bibliography: Arid land resource information paper no. 6, Office of Arid Lands Studies, University of Arizona, Tuscon, 278 p.

Contact: NTIS (copy)

Key Categories: BIBLIOGRAPHY, COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 03

Water is basic to energy conversion systems and particularly important for energy extraction and conversion in arid lands where water is scarce. The historical past is utilized as a record for casting modern development plans into perspective; the worldwide growth in energy consumption rates is considered as the motive force behind many current energy projects in arid lands. Energy sources (coal, oil, gas, oil shale, solar energy, alternative energy, alternative energy sources, fission, fusion, and geothermal) are reviewed in terms of their consequences on the air, land, water, and inhabitants of such regions. Two rivers, the Colorado and the Missouri, provide small-scale models of the rewards and hazards of heavily exploiting water-short areas. In both instances, energy development plans, as now proposed, will seriously deplete the water supply, alter the quality of the water, land, and air, and increase the human population. A great deal of energy can be extracted from arid lands but the consequences of such extraction on the environment are but sketchily known because development plans have received more attention than environmental impact.

✓ 935

ABSTRACT

Accession Number:
@ 155.2
Branson, F.A., and Owen, J.B., June 1970, Plant cover, runoff, and sediment yield relationships on Mancos shale in Western Colorado: Water Resources Research, v. 6, no. 3, p. 783-790.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, SEDIMENT, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 01

Relationships between vegetation and hydrologic measures for 17 watersheds near Grand Junction, Colorado, were subjected to correlation analyses. Six years of vegetation measurements, four vegetation measurement methods, and 15 years of hydrologic records were used in the analyses. Highly significant correlation coefficients were found for percent bare soil and runoff, but the relationships between bare soil and sediment yields were not statistically significant. Geomorphic parameters were more highly correlated with sediment yields than with runoff. Correlation coefficients for spring vegetation measurements and runoff were higher than for autumn measurements. First contact methods and step point vegetation measurement methods were superior to the loop method and the all contacts point method. Curves for the relationship of runoff to bare soil were strikingly different for three sets of watersheds from different precipitation zones. Bare soil measurements may provide rapid and inexpensive estimates of runoff for watersheds similar to the ones studied.

Colorado
TT

936

ABSTRACT

Accession Number:
@ 155.3
Brennan, R. and Grozier, R.U., 1976, Salt-Load computation--Colorado River, Cameo, Colorado, to Cisco, Utah: Part 1. data summary (15 p.) and Part 2. basic data, U.S. Geological Survey Open-File Report, 222 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, UTAH, SALINITY

Access Code: 002 Use Code: 02

Salt-load computations for the inflow and outflow stations in the Grand Valley area of Colorado have been computed using five methods. The salt-load increase of he Colorado River from the Grand Valley has been computed for the Colorado-Utah State line station and the Colorado River near Cisco, Utah, station. Most of the salt loads give values about +/-30 percent of the average for all methods used, but differences of 70 percent do occur.

Part 2 contains the basic data for the salt-load computations, Colorado River, Cameo, Colorado, to Cisco, Utah. The basic data consists of regression curves of discharge versus specific conductance and specific conductance versus calcium, magnesium, hardness, sodium, bicarbonate, chloride, dissolved solids, and sulfate; duration tables of daily discharge and daily specific conductance at six stream-gaging sites; and daily specific-conductance data for the period of record for all stations in the study area. Location of streamflow and water-quality stations are shown on a map of the study area.

✓ 937

ABSTRACT

Accession Number:
@ 155.4
Britton, L.J., and Wentz, D.A., 1980, Water-quality characteristics of selected lakes and reservoirs in Colorado: U.S. Geological Survey Open-File Report 80-436, 139 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 011 Use Code: 02

During the summers and autumns of 1973, 1974, and 1975, water-quality data were collected and compiled for 56 lakes and reservoirs in Colorado. The lakes and reservoirs sampled range from large reservoirs in the eastern part of the state to smaller natural lakes in the higher western parts of the Colorado plateaus. The smallest body of water sampled was Anderson Reservoir No. 1 with a surface area of 47 acres in Mesa County, and the largest was Navajo Reservoir with a surface area of 15,600 acres in Archuleta County. The report includes physical, chemical, and biological water-quality data collected as a part of each lake or reservoir. A subjective evaluation of the trophic (enrichment) state is presented based on nutrient and phytoplankton concentrations and the trophic-state index, based on Secchi-disk transparency (a measure of light penetration) is reported, to show trophic comparisons between lakes and reservoirs.

ABSTRACT

Accession Number:
@ 156
Broom, M.E., and Major, T.J., 1960, Springs of Colorado: in Colorado year book, 1959-1961: 25th edition, Denver, Colorado State Planning Division, p. 470-471.

Contact: USGS Library (loan)

Key Categories: COLORADO, SPRINGS

Access Code: 011 Use Code: 03

This brief article includes a general discussion on the origin, source, and use of springs in Colorado. It includes a table which lists over 30 thermal springs together with their temperature and conductivity.

✓ 938

ABSTRACT

Accession Number:
@ 156.1
Brown, A., and Stewart, B.M., 1978, Water management for oil shale mining and retorting in the Piceance Creek basin, Colorado: in Proceedings of the 11th Oil Shale Symposium, Golden, Colorado, Colorado School of Mines Press, p. 214-226.

Contact: Colorado School of Mines (copy)

Key Categories: IN-SITU, PROCESS WATER USE

Access Code: 011 Use Code: 01

This paper describes the results of part of a project funded and directed by the U.S.B.M. and performed by Golder Associates which addresses the water management aspects of the Colorado oil shale industry, looking in detail at three sites in the Piceance Basin, and a number of commercial-sized mines/retort complexes at each site. Mine water inflow has been estimated from detailed studies of geology and available hydrology data. Net water requirements of processing and disposal have been determined for several process and disposal scenarios at each site. From these two results, the likely water surplus or deficit is found. Within the framework of legal and regulatory agency constraints, optimal ways of obtaining make-up water, and/or disposing of any water surplus have been determined.

ABSTRACT

Accession Number:
@ 157
Brown, A., Schauer, M.I., Rowe, J.W., and Heley, W., Sept. 1977,
Water management in oil shale mining: v. 1-main text, Golder
Assoc., Inc., Kirkland, Washington, 436 p.

Contact: NTIS (copy)

Key Categories: SURFACE, IN-SITU, COMPUTER MODELS, PROCESS WATER USE, COLORADO, ENVIRONMENTAL, LEACHING

Access Code: 011 · Use Code: 01

This report details work performed and results obtained in a study of the water management aspects of oil shale mining and retorting in the Piceance Creek Basin. Three specific sites were investigated, and optimal water management systems for both conventional and in-situ extraction processes were generated. Water-related legal and environmental constraints on development were identified and the water management schemes were developed in compliance with these regulations. Limitations on shale oil production implied by limited water supplies were evaluated. Potential Basin-wide effects of development were evaluated using a computer model, and mitigation strategies were developed. Recommendations for additional investigation and analyses were presented.

US Bureau of Mines, Washington, D.C. Rept. no
BuMines - OFR - 2(1) - 78.

(See Accession no. 158)

dup

ABSTRACT

Accession Number:
@ 142
Birman, B.E., and Schick, J.T., 1978, Preliminary hydrologic investigation of the TOSCO Corporaton Sand Wash area, Uintah County, Utah: report prepared by Geothermal Surveys, Inc., South Pasadena, CA for TOSCO Corp., Los Angeles, CA, 83 p. plus plate.

Contact: Barbara Birman (copy)

Key Categories: UTAH, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE

Access Code: 011 Use Code: 02

This report presents the results of a preliminary hydrologic investigation of the Sand Wash area in Uintah County, Utah. The investigation includes a literature search on the hydrogeologic setting of the Unita Basin and a field reconnaissance of the Sand Wash area.

A water balance equation is developed for the Sand Wash site, and the available surface water hydrology data are reviewed and interpreted in the framework of this balance to facilitate identificatio of data gaps. Existing information on precipitation, evapotranspiration surface runoff, and subsurface outlfow are reviewed, and the location of NOAA and USGS precipitation stations within Uintah County are shown on maps. Isohyetal maps of average annual precipitation are provided. The literature on geohydrology and surface water quality is also reviewed.

ABSTRACT

Accession Number:
@ 158
Brown, A., Schauer, M.I., Rowe, J.W., and Heley, W., Sept. 1977,
Water management in oil shale mining: v. II-appendices, Golder
Associates, Inc., Kirkland, Washington, 354 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WATER LAW, COMPUTER MODELS, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code 01

This report presents the appendices to a study to develop economical, technically feasible, and environmentally acceptable methods of water management for oil shale processing. It presents a bibliography on the topic, summarizes legal and regulatory aspects of water management for a Colorado oil shale industry, presents analyses of mine inflow, summarizes geohydrologic data, describes the finite element computer model used for groundwater flow calculations, and presents predicted inflow to a proposed block caving demonstration mine at Horse Draw.

U.S. Bureau of Mines, Washington, D.C.
Rept. no. BuMines-OFR-2(2)-78

939

ABSTRACT

Accession Number:
@ 158.1
Brown, R., Ed., May 1979, Health and environmental effects of oil shale technology, a workshop summary and panel reports for the Federal Interagency Committee on the Health and Environmental Effects of Energy Technologies, U.S. DOE Rep. DOE/HEW/EPA-02, 258 p. plus appendix.

Contact: NTIS (copy)

Key Categories: COLORADO, UTAH, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This report is the result of a workshop which addressed the health and environmental effects of oil shale technology. The purposes of this workshop were: to assemble biomedical and environmental scientists, representative of a broad range of disciplines, to address current developments in oil shale technology; to review and identify specific health and environmental issues and problems associated with the development and commercialization of oil shale technology; and to consider the research strategies required to address them and to identify the requisite research information needs, expressed via detailed task statements, for resolving the uncertainties of assessing the relevant impacts of oil shale technology. Throughout the workshop, attendees participated in six panels: health effects; air quality; water quantity, quality, and aquatic ecology; terrestrial effects; ambient measuring and monitoring; and source characterization. This report contains a presentation of the highlights of the issues considered by the panels and the panel reports which contain specific information on environmental and health effects, information requirements, and detailed research statements.

ABSTRACT

Accession Number:
@ 159
Brown, T.H., 1974, An economic evaluation of salinity damage from oil shale development: M.S. Thesis, University of California, Berkeley, 95 p.

Contact: University of California (copy)

Key Categories: COLORADO, SALINITY, EFFLUENTS, SURFACE,

Access Code: 000 Use Code: 02

inventory

940

ABSTRACT

Accession Number:
@ 159.1
Bureau of Land Management, 1982, Bookcliffs resource area water inventory: computer listing.

Contact: Bureau of Land Management - Vernal (copy)

Key Categories: UTAH, WATER RIGHTS, SPRINGS, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 01

This inventory provides a thorough and comprehensive account of all waters on the Bookcliffs Resource Area, including location and quantities. The information is baseline data which assisted in asserting the legal claims to all waters within this resource area, as well as providing data necessary to administer and manage the Bureau waters. In addition, all Public Water Reserves on the resource area were inventoried and a listing of field study work and recommendations should make it possible to determine those reserves which are of importance and which should be deleted.

The primary methods for determining the water locations on the district involved the use of topographic maps, land status maps and aerial photographs. BLM employees, grazing allotment permittees and local well drillers were often able to direct the developers of this inventory to undeveloped springs, seeps and old water holes. Public Water Reserve files and current water filings also provided water locations, although most of these locations are delineated on the topographic or land status maps. Normally BLM project files helped to locate developed water sites but due to the disarray of the Bookcliffs project files, this information source was not useful. Much of the southern part of the Bookcliffs Resource Area is inaccessible by vehicle, and it was inventoried by a helicopter. This method provided a thorough search for springs, seeps and other non-developed waters.

ABSTRACT

Accession Number:
@ 160
Bureau of Land Management, 1982, Uintah basin synfuels development project environmental impact statement, [draft due 1982].

Contact: Jack Edwards (status)

Key Categories: SURFACE, IN-SITU, ENVIRONMENTAL, UTAH, PROCESS WATER USE, EFFLUENTS

Access Code: 002 Use Code: 01

The BLM is preparing an environmental statement on seven synfuel projects in Utah. The five oil shale projects are TOSCO Sand Wash, Magic Circle, Geokinetics, Paraho-Ute, and Syntanna-Utah. The two tar sands projects are those by Sohio and Enercor-Monopower. Each developer has prepared a detailed technical report describing their project. These reports are an excellent source of process water use, effluent, and other process data, and will be published as appendices to the EIS. The draft EIS is scheduled for release around October 1982.

Status 941

ABSTRACT

Accession Number:
@ 160.1
Bureau of Land Management, 1982, Chevron Clear Creek environmental impact statement, [draft due 1982].

Contact: Bob Kline (status)

Key Categories: SURFACE, COLORADO, ENVIRONMENTAL, PROCESS WATER USE, EFFLUENTS

Access Code: 002 Use Code: 01

The BLM is preparing an environmental impact statement for the Chevron Clear Creek oil shale project. The backup files for this on-going project contain valuable information on the Chevron process and environmental data from the Clear Creek site, including aquifer pump tests and site monitoring data on climate, surface water quality and quantity, and others.

ABSTRACT

Accession Number:
@ 161
Bureau of Land Management, 1981, White River dam project, draft environmental impact statement: Richfield, Utah, 207 p.

Contact: BLM - Vernal (copy)

Key Categories: UTAH, ENVIRONMENTAL, PRESENT WATER USE

Access Code: 011 Use Code: 01

This statement assesses the environmental consequences of five alternatives designed to supply water for energy development, including oil shale in Uintah County, Utah. The alternatives involve the Utah Division of Water Resources proposal (1) to construct the White River Dam and Reservoir; also, (2) No Action; (3) pumping from the White River and augmenting from Hell's Hole Canyon Dam; (4) pumping from Green River; (5) pumping from White River and supplementing with water pumped from the Green River.

The major environmental topics discussed are related to minerals, paleontology, soils, water, vegetation, wildlife, threatened and endangered plant and animal species, cultural resources, land use, and socioeconomics.

ABSTRACT

Accession Number:
@ 162
Bureau of Land Management, July 1981, Project management plan for synfuels development in the Uintah basin region: BLM - Vernal District.

Contact: BLM - Vernal (copy)

Key Categories: UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 02

This synfuels project management plan has been prepared to present a consolidated approach to right-of-way application processing and environmental impact statement preparation. The main objective of the management plan is to obtain coordinated and complete information on the cumulative socio-economic, environmental and management impacts of the various projects on the Uintah basin.

ABSTRACT

Accession Number:
@ 163
Bureau of Land Management, 1981, Rangeland program summary, White
River resource area: Craig, 21 p.

Contact: BLM - Craig (copy)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 03

The Bureau of Land Management has completed an Environmental Impact Statement on grazing management for the White River Resource Area. This document is a summary of that statement and the record of decision to implement the proposed program.

The Resource Area consists of 2,165,675 acres, of which 1,521,806 acres are public lands managed by BLM. In addition, two livestock allotments in Utah containing 9,438 acres of public land are managed by the White River Resource Area and are included in this document. At present, 100 operators graze livestock on 139 allotments. Current established allotments vary from 40 to 134,602 acres of public land in size and grazing capacities range from 7 to 14,716 animal unit months (AUMs). Six allotments are intensively managed under existing allotment management plans (AMPs). Currently, BLM authorizes 160,306 AUMs of livestock grazing use, however, the normal grazing use made each year is only 136,600 AUMs.

942

ABSTRACT

Accession Number:
@ 163.1
Bureau of Land Management, 1981, Uinta-Southwestern Utah, final environmental impact statement, coal: 349 p. plus appendices and maps.

Contact: BLM - Salt Lake City (copy)

Key Categories: COLORADO, UTAH, ENVIRONMENTAL

Access Code: 011 Use Code: 01

The Uinta-Southwestern Utah coal region encompasses all of the Utah oil shale basin and the southern portion of the Colorado oil shale basin. This statement assesses the environmental consequences of five alternative levels of coal development, including development of the Hollberg Preference Right Lease Application (PRLA) area and an exchange of Utah Power and Light Company (UP&L) PRLA lands for coal leases on the Wasatch Plateau. The alternatives range from leasing 11 tracts (561.8 million tons) to leasing three tracts (153.7 million tons), and also includes the no action alternative. Alternative Two, the high level scenario (465.2 million tons) involving the leasing of seven tracts on the Wasatch Plateau for underground mining only, is the preferred alternative. The statement assesses impacts that would occur in Carbon, Emery, Sanpete, and Sevier Counties as a result of proposed coal leasing and development, and impacts from the UP&L exchange on the Kaiparowits Plateau in Garfield and Kane Counties.

This report describes each alternative and the existing environment, and it presents the environmental impacts of each alternative. The public hearing comments and responses are summarized. Appendices present information on major plant communities and typical species occurring in Central Utah, results of air quality modeling, pheasant population estimate formula, net energy analyses, and other information.

ABSTRACT

Accession Number:
@ 164
Bureau of Land Management, 1980, Green River-Hams Fork final environmental impact statement, coal: v. I - 358 p., and v. II.

Contact: BLM - Craig (copy)

Key Categories: WYOMING, COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 01

This final EIS evaluates the environmental impacts of additional leasing in northwest Colorado and southcentral Wyoming. Coal production from these tracts is expected to meet a 1987 annual shortfall of new production of 18.5 million tons and to allow existing mines to continue operation. The environmental impacts of four leasing alternatives, including the Preferred Alternative, are analyzed in this EIS, as well as a No Action Alternative. The Preferred Alternative would foster the production of 719.5 million tons of coal, increase employment in the region by 2,136 by 1995, and result in the cumulative disturbance of 34,110 acres of land. The impact analysis shows that generally most impacts gain their significance by adding to greater impacts brought on by other developments in the area.

Volume I of this EIS repeats the information contained in Part I of the draft EIS (Abstract No. 165), modified to consider comments received during the review period. Volume II lists the issues raised during the review and presents the BLM's response, and it compiles the comment letters.

ABSTRACT

Accession Number:
@ 165
Bureau of Land Management, 1980, Green River-Hams Fork, draft environmental impact statement, coal: part I - 332 p., and part II - 492 p.

Contact: BLM - Craig (copy)

Key Categories: WYOMING, COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 01

This draft EIS evaluates the environmental impacts of lease offerings of 13 tracts of coal in northwest Colorado and southcentral Wyoming. Coal production from these tracts is expected to meet a 1987 annual shortfall of new production of 18.5 million tons and to allow existing mines to continue operation. The environmental impacts of four leasing alternatives, including the Preferred Alternative, are analyzed in this EIS, as well as a No Action Alternative. The Preferred Alternative would foster the production of 789.5 million tons of coal, increase employment in the region by 3,150 by 1995, and increase population by 6,827 by 1995, and result in the cumulative disturbance of 33,433 acres of land. The impact analysis shows that generally most impacts gain their significance by adding to greater impacts brought on by other developments in the area.

Part I of this EIS describes the purpose and need for the proposed actions, the proposed actions and alternatives, and the baseline conditions, and environmental impacts. Part II compiles environmental impact matrices for 16 sites used in the site-specific analyses. Appendix B of this Part describes the computational procedures used to determine water use, changes in salt load, discharge-weighted average dissolved solids in North Platte, Yampa, and Colorado Rivers, and sediment yield. The results of some of these calculations are tabulated.

ABSTRACT

Accession Number:
@ 166
Bureau of Land Management, 1980, White River resource area grazing management, final environmental impact statement: 109 p.

Contact: BLM - Craig (copy)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This final EIS evaluates The Bureau of Land Management rangeland management program for the White River Resource Area in the Craig District. The overall objective of the proposal is to provide an improved rangeland condition capable of supplying 182,888 animal unit months (AUMs) of forage in the short term and 229,758 AUMs by the year 2000 for use by big game wildlife, wild horses, and livestock on a sustained yield basis.

This volume contains a summary of the proposal and alternatives and of their environmental impacts. It also compiles comment letters on the draft EIS and presents revisions to the draft EIS. The draft EIS (Abstract No. 167), which was not reprinted, is incorporated into the final EIS as Volume I as it did not require significant changes in data, analysis, or conclusions.

ABSTRACT

Accession Number:
@ 167
Bureau of Land Management, 1980, White River resource area, grazing management, draft environmental impact statement: 341 p. plus 3 maps.

Contact: BLM - Craig (copy)

Key Categories: COLORADO, ENVIRONMENTAL, SEDIMENT

Access Code: 011 Use Code: 03

This draft EIS evaluates the Bureau of Land Management rangeland management program for The White River Resource Area in the Craig District. The overall objective of the proposal is to provide an improved rangeland condition capable of supplying 182,888 animal unit months (AUMs) of forage in the short term and 229,758 AUMs by the year 2000 for use by big game wildlife, wild horses, and livestock on a sustained yield basis.

This draft EIS describes the alternatives, baseline conditions in the affected areas, and environmental consequences of each alternate. The report includes a series of maps which summarize annual precipitation, sediment yield, soil associations, and other information for the study area. One of the appendices describes the methods and results used in the sheet erosion and runoff calculations for various alternatives.

No 168

ABSTRACT

Accession Number:
@ 169
Bureau of Land Management, 1980, Proposed Superior Oil Company land exchange and oil shale resource development: final environmental statement: 62 p.

Contact: BLM - Craig (copy)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This final EIS on the Superior multimineral proposed land exchange compiles written comments and responses and presents oral comments from public hearings. The process description and environmental assessment are presented in the draft EIS (Abstract No. 170)

✓ 943

ABSTRACT

Accession Number:
@ 169.1
Bureau of Land Management, 1980, Uinta-Southwestern Utah, draft environmental impact statement, coal: 248 p. plus appendices.

Contact: BLM - Salt Lake City (copy)

Key Categories: UTAH, COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 01

The Uinta-Southwestern Utah coal region encompasses all of the Utah oil shale basin and the southern portion of the Colorado oil shale basin. This draft statement assesses the environmental consequences of five alternative levels of coal development. The alternatives range from leasing 11 tracts (572.6 million tons) to leasing three tracts (171.3 million tons), and also includes the no action alternative. The statement assesses impacts that would occur in Carbon, Emery, Sanpete, and Sevier Counties as a result of proposed coal leasing and development, and impacts from the UP&L exchange on the Kaiparowits Plateau in Garfield and Kane Counties.

The report describes each alternative and the existing environment, including climate, air quality, soils, water resources, geology, and others. The environmental impacts of each alternative are discussed.

ABSTRACT

Accession Number:
@ 170
Bureau of Land Management, July 1979, Proposed Superior Oil Company
land exchange and oil shale resource development, draft
environmental statement: 105 p.

Contact: BLM - Colorado State Office (copy)

Key Categories: COLORADO, ENVIRONMENTAL, PROCESS WATER USE, SURFACE, EFFLUENTS

Access Code: 011 Use Code: 01

The Superior Oil Company requested an exchange of public land for private land. With the exchange, an economical mining unit would be formed and oil shale resources developed. Major federal actions would be the revoking of the oil shale withdrawal by the Secretary of the Interior and the exchange of land by the Bureau of Land Management. Following the exchange, Superior would construct an underground mine and a processing plant. The mine would produce an average of about 26,000 tons of oil shale daily. From the oil shale, the plant would produce about 4800 tons of nahcolite, 11,500 barrels of shale oil, 580 tons of alumina, and 1000 tons of soda ash daily. Production would continue for about 20 years. Above-ground facilities would occupy about 380 areas. Approximately 920 people would be employed during operation of the project. Products would be hauled from the plant by truck.

ABSTRACT

Accession Number:
@ 171
Bureau of Land Management, May 1979, Hydrologic modeling of coal lands: in cooperation with the Water Resources Division of the U.S. Geological Survey.

Contact: BLM - Craig (loan)

Key Categories: COMPUTER MODELS

Access Code: 102 Use Code: 01

The BLM and USGS-WRD have cooperatively embarked on the development, testing and application of a small watershed hydrologic model that will provide BLM and USGS hydrologists the capability of predicting water resource impacts from coal development.

The model is a modular-design distributed-parameter hydrologic model that uses mathematical relationships to represent the hydrologic system. The USGS-WRD is responsible for developing and testing the model; BLM is responsible for interpreting the model outputs and for identifying and appraising the USGS-WRD of BLM'S program needs.

Twenty study basins, used for development and testing of the model, have been established in the major coal regions involved in the Energy Mineral Rehabilitation Inventory and Analysis program. Two additional basins will be instrumented, one each in Utah and Wyoming. Approximately three to five years of data will be needed in order to calibrate and verify the model in unmined basins. The calibration process has begun already in Colorado and Alabama. Each basin was not only selected to represent the region it is in, but also selected for its high potential for being mined in the near future. Once mining occurs in the study basin, the model can be verified for its ability to predict hydrologic response during and after mining and through the reclamation phase.

ABSTRACT

Accession Number:
@ 172
Bureau of Land Management, 1978, Development of coal resources in
southwestern Wyoming, final environmental statement:
v. 1-regional analysis, R9-260.

Contact: BLM - Vernal (copy)
U.S. Government Printing Office (copy)

Key Categories: WYOMING, ENVIRONMENTAL, CLIMATE

Access Code: 011 Use Code: 01

The scope of this regional analysis includes the cumulative impacts of all coal developments proposed for federal approval, the continuance of mines previously authorized on existing leases, the development of private coal mines requiring no federal authorizations, and other developments occurring or expected to occur within the Southwestern Wyoming Coal Environmental Statement (ES) region. It analyzes the impacts of federal, state, and private actions that, if fully implemented or adopted as discussed herein, could lead to the production of 31.2 million tons of coal per year by 1990 from the region. Regional impacts are assessed at three points in time, 1980, 1985, and 1990.

The geographic ES region, consisting of approximately 6.3 million acres, includes all of Uinta and portions of Lincoln and Sweetwater Counties, Wyoming. The boundaries of the ES region are colinear with planning area boundaries within the Rock Springs District of the Bureau of Land Management.

This volume describes the proposed development and existing environment in the ES region and it includes a good summary of existing data. Environmental impacts are discussed and those that cannot be avoided if the proposal is implemented are described. Alternatives and their impacts are also presented. Site specific analyses for each proposed mine site are included in Volume II (Abstract No. 173).

ABSTRACT

Accession Number:
@ 173
Bureau of Land Management, 1978, Development of coal resources in Southwestern Wyoming, final environmental statement: v. 2-site specific analysis.

Contact: BLM - Vernal (copy)

Key Categories: WYOMING, ENVIRONMENTAL

Access Code: 011 Use Code: 01

This volume summarizes the five site specific analyses that were evaluated in the southwestern Wyoming final coal EIS (see Abstract No. 172). These five sites are: North Block, Twin Creek, South Haystack, Long Canyon, and Black Butte. The analysis for each site covers the existing environment, environmental impacts, mitigating measures, alternatives and their impacts, and a description of any impacts which cannot be avoided.

ABSTRACT

Accession Number:
@ 174
Bureau of Land Management, 1978, State of Wyoming water management
program: 47 p.

Contact: BLM - Cheyenne (loan)

Key Categories: WYOMING, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 000 Use Code: 03

175 missing
176

ABSTRACT

Accession Number:
@ 177
Bureau of Land Management, 1978, Federal coal management program, draft environmental statement: Washington, D.C.

Contact: U.S. Government Printing Office (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This draft programmatic environmental statement considers the environmental impacts of seven alternatives for a Federal coal management program to be adopted by the Department of the Interior. The proposed action is the adoption of the preferred Federal coal management program. The program would establish standards and procedures for determining when, where, and in what manner coal owned by the United States Government should, through competitive lease sales, be sold to parties who will cause the coal to be mined.

This is a programmatic statement which assesses the national impacts of the Federal coal management program and related Federal coal policies. The statement covers all major national aspects of the management program and alternatives, and assesses impacts of alternative programs in twelve specific coal regions. Three of them fall in oil shale basins in Colorado, Utah, and Wyoming.

The methodology used in this programmatic statement is a general predictive approach based on national and regional data and using necessary assumptions where firm data are not available.

The unavoidable national and inter-regional water resources impacts of coal production that could result from decisions made under this program include land subsidence, competition of new water demands with existing agricultural and municipal demands, lowering of water quality, and disruption of aquifers.

ABSTRACT

Accession Number:
@ 178
Bureau of Land Management, 1977, Pioneer Trails area, Wyoming land use
decisions: 48 p.

Contact: BLM - Cheyenne (copy)

Key Categories: WYOMING, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This brochure summarizes land use decisions in the management framework plan for the Pioneer Trails planning unit. The MFP with related documents is available in the Kemmerer area office.

Key issues relevant to lands, minerals, forest products, range management, wild horses, watershed management, recreation, and wildlife are overviewed. Erosion conditions of lands in the study area are summarized. A series of color maps displays pertinent information relevant to each of these key issues.

ABSTRACT

Accession Number:
@ 179
Bureau of Land Management, 1977, Salt Wells and Pilot Butte area, Wyoming land use decisions: 49 p.

Contact: BLM - Cheyenne (copy)

Key Categories: WYOMING, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This brochure summarizes land use decisions in the management framework plan for the Salt Wells-Pilot Butte planning unit. The Salt Wells-Pilot Butte plan with related documents is available at the area office in Kemmerer.

Key issues relevant to lands, minerals, forest products, range management, wild horses, watershed management, recreation, and wildlife are overviewed. Erosion conditions of lands in the study area are summarized and the Red Creek drainage is singled out as a critical watershed. A series of color maps display pertinent information relevant to each of these key issues.

ABSTRACT

Accession Number:
@ 180
Bureau of Land Management, Oct. 1976, The feasibility of salinity control from national resource lands in the Upper Colorado River Basin: interim report.

Contact: BLM - Craig (loan)

Key Categories: COLORADO, UTAH, WYOMING, SALINITY

Access Code: 102 Use Code: 02

This is an interim report designed to describe, (A) the process used in studying the problem of salinity from diffuse sources on national resource lands (NRL); (B) what is known about the factors affecting salinity from existing research; (C) results of limited investigations on several watersheds important to the Bureau of Land Management (BLM); (D) research presently funded by BLM to answer questions about mechanisms involved in salt movement into the Colorado River; and (E) recommended steps needed to be taken during the coming year and in the future.

The final report, due on October 1, 1977, will recommend alternative technically feasible treatments capable of reducing salinity originating on NRL. It will also include an analysis of the relative costs and benefits incurred by each treatment.

ABSTRACT

Accession Number:
@ 181
Bureau of Land Management, 1975, Proposed development of oil shale resources by the Colony Development Operation in Colorado, final environmental statement: v. I and v. II.

Contact: Bob Kline (copy)

Key Categories: COLORADO, LEACHING, EFFLUENTS, ENVIRONMENTAL, RECLAMATION, SURFACE WATER QUALITY, PROCESS WATER USE, SURFACE

Access Code: 011 Use Code: 01

This statement is an analysis of environmental impacts that may result from proposed Federal actions in connection with development of an oil shale plant, mine, service corridor, land exchange, products pipeline, water use contracts, and power line corridor by Colony Development Operation.

The EIS was prepared in response to an interstate right-of-way request to transport upgraded shale oil from Colony's Dow West property near Grand Valley, Colorado to Lisbon Valley Station, Utah.

This report evaluate the impacts associated with a 47,000 BPD oil shale plant based on the TOSCO II process. Volume I contains an excellent description of the proposed oil shale facility, including solid waste disposal and water supply. It also describes the existing environment and presents the results of impact analyses. Volume 11 summarizes the results of public comments, and appendices present the oil spill contingency plant, annual precipitation and temperature records, and compile individual public letters.

ABSTRACT

Accession Number:
@ 182
Bureau of Land Management, 1973, Draft environmental statement for a proposal by the state of Utah to select oil shale lands in the Uinta basin: 225 p.

Contact: BLM - Vernal (loan)

Key Categories: ENVIRONMENTAL, UTAH

Access Code: 002 Use Code: 03

The proposed action is to classify 156,940 acres of national resource lands (formerly referred to as public lands) in the Bookcliff Mountains area of Uintah County, Utah for selection by the State of Utah.

Environmental impacts related to the proposed action are of two distinct types: (1) those associated with the change in administration of these lands from Bureau of Land Management to the State of Utah; and (2) those associated with full-scale leasing and development.

Impact associated with changes in administration will result from the State acquiring all resource management responsibility on the 157,000 acres, except for approximately 36,000 acres of KGS lands (known geologic structures which have been producing oil and gas) which will continue to be administered by BLM. This will result in additional fragmentation of resource management responsibilities.

Impacts associated with leasing and development of oil shale would produce both direct and secondary impacts on the environment of Utah and Colorado. Many of the environmental changes would be of local significance, while others would include larger, and cumulative impact. Specific impacts would include those on land, water resources, air quality, fish and wildlife populations and habitat, grazing and agricultural activities, recreation and aesthetic values, and social and economic patterns.

ABSTRACT

Accession Number:
@ 183
Bureau of Land Management, and Rural Electrification Administration,
1981, Moon Lake power plant project units 1 and 2, final
environmental impact statement, Salt Lake City, Utah, Rep.
(USDA-REA (ADM) 81-1-F), 578 p.

Contact: BLM - Vernal (copy)

Key Categories: UTAH, ENVIRONMENTAL

Access Code: 011 Use Code: 01

The Deseret Generation and Transmission Cooperative, headquartered in Sandy, Utah and comprised of six rural electric distribution cooperatives, has applied to the Bureau of Land Management for rights-of-way to utilize public lands in development of their Moon Lake power plant project, units 1 and 2. Deseret has also applied to the Rural Electrification Administration for loan guarantees to finance the project.

This EIS will be used by BLM and the Forest Service as input in decisions regarding use of Federal land, by REA in decision on loan guarantees, by Office of Surface Mining in decisions on the mine plan, and by other Federal, State and local agencies.

This statement assesses the environmental consequences of alternatives designed to meet, at least in part, the baseload energy needs of the Deseret Generation and Transmission Cooperative of Sandy, Utah. The statement focuses on alternative power plant sites, coal supply and transport systems, water supplies, energy generation technologies, and energy conservation as well as the No Action alternative.

The major environmental topics discussed are related to air quality, water resources, threatened and endangered fish species, land use, and socioeconomics. A discussion is also provided on the purpose and need for the proposed project.

ABSTRACT

Accession Number:
@ 184
Bureau of Land Management, and Rural Electrification Administration, 1981, Moon Lake power plant project units 1 and 2, draft environmental impact statement, Salt Lake City Utah, Rep. (USDA-REA (ADM) 81-1-0), 338 p., appendices plus map.

Contact: BLM - Vernal (copy)

Key Categories: UTAH, ENVIRONMENTAL

Access Code: 011 Use Code: 01

The Deseret Generation and Transmission Cooperative, headquartered in Murray, Utah and comprised of six rural electric distribution cooperatives, applied to the Bureau of Land Management for rights-of-way to utilize public lands in development of their Moon Lake power plant project, units 1 and 2. Deseret has also applied to the Rural Electrification Administration (REA) for loan guarantees to finance the project.

This statement assesses the environmental consequences of alternatives designed to meet, at least in part, the baseload energy needs of the Deseret Generation and Transmission Cooperative of Murray, Utah. The statement focuses on alternative power plant sites, coal supply and transport systems, water supplies, energy generation technologies, and energy conservation as well as the No Action alternative.

The major environmental topics discussed are related to air quality, water resources, threatened and endangered fish species, land use, and socioeconomics. A discussion is also provided on the purpose and need for the proposed project.

ABSTRACT

Accession Number:
@ 185
Bureau of Reclamation, Impacts on the lower Colorado River region resulting from alternative levels of emerging energy development in the Upper Colorado River region:

Contact: BLM - Denver Special Projects Office

Key Categories:

Access Code: 070

Use Code:

944

ABSTRACT

Accession Number:
@ 185.1
Bureau of Reclamation, 1982-1989, General Investigations and Feasibility Studies.

Contact: Richard Lassen (status)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN, ENVIRONMENTAL

Access Code: 002 Use Code: 01

The Bureau of Reclamation is presently preparing environmental impact statements and feasibility studies on a number of water resource and salinity control projects in the study area that will affect water quality and water supply for an oil shale industry. Descriptions of these projects may be found in other reports in this bibliography by the Bureau of Reclamation. The pertinent list of projects and their projected completion schedule, as of January 1982 are summarized here. The reader should contact Richard Lassen, U.S. Bureau of Reclamation, Salt Lake City, for an update on this list.

	DRAFT EIS	FINAL EIS
Uinta Basin	September 1982	December 1983
Uinta Basin II	February 1988	May 1989
Glenwood-Dotsero	December 1983	March 1985
Big Sandy	May 1984	August 1985
Meeker-Dome	August 1983	November 1984
Flaming Gorge	August 1983	November 1984
Dominguez Reservoir	March 1982	June 1983

945

ABSTRACT

Accession Number:
@ 185.2
Bureau of Reclamation (Water and Power Resources Service), May 1982,
Concluding report on the West Divide project, Colorado: with
appendices A-F.

Contact: Richard Lassen (copy)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 01

This report presents the results of planning studies on the West Divide Project in Colorado. The report includes individual chapters which describe: project area; problems and needs; development plans; design and cost estimates; water supply; irrigation; project effects on municipal water, recreation, etc; environmental analysis; economic and financial analysis; and plan formulation.

The appendices, published separately, contain detailed analyses on specific aspects of the project as follows: Appendix A: Design and Estimates and Operation, Maintenance, and Replacement; Appendix B: Water Supply; Appendix C: Project Lands and Drainage; Appendix D: Agricultural Economy and Social Assessment; Appendix E: Financial and Economic Analysis and Plan Formulation; and Appendix F: Recreation, Fish and Wildlife Resources, and Cultural Resources.

946

ABSTRACT

Accession Number:
@ 185.3
Bureau of Reclamation, Water and Power Resources Service, May 1981,
Upalco Unit, Central Utah Project, supplement to definite plan
report: Upper Colorado Region, 54 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: UTAH, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 01

The Upalco Unit is one of four units of the Initial Phase of the Central Utah Project. The Upalco Unit would develop an average of 22,300 ac-ft/yr of water, including 19,300 ac-ft for irrigation and 3,000 ac-ft for municipal and industrial use in Roosevelt and other smaller communities in the area. The water supply would be developed by storage of surplus flows of Lake Fork and Yellowstone Rivers, elimination of some seepage losses in existing canals, and increased use of irrigation return flows.

This report is a supplement to the Upalco Unit Definite Plan Report of March 1980 and presents results of more recent investigations and proposed changes to the plan described in that report. These changes include moving the Taskeech Dam site downstream some 700 feet and increasing the municipal and industrial supply from 2,000 to 3,000 ac-ft/yr.

ABSTRACT

Accession Number:
@ 186
Bureau of Reclamation, 1981, Saline water use and disposal opportunities: Colorado River water quality improvement program, special report.

Contact: USBR - Denver (copy)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY

Access Code: 011 Use Code: 01

This special report presents innovative alternative plans for collecting, treating and transporting saline water for energy development use or disposal in the Colorado River Basin. The concepts developed are considered alternatives to conventional structural salinity control methods which involve lined evaporation ponds and desalination plants. Heavy emphasis is placed on beneficial use of saline water to mitigate the depletion impact of its removal from the river system by structural control. Preliminary costs are developed for selected alternatives showing favorable cost-effective comparisons with current structural control measures. The report addresses the potential cost savings for the most promising alternatives of local saline water use by powerplants and by coal slurry pipeline.

Sixteen saline water sources were evaluated in various collection configurations for local use or export (i.e. Meeker Dome, Glenwood-Dotsero Springs, etc.). Opportunities for using saline water in powerplant cooling, industrial processing, and coal slurry pipelines were identified. About 42 potential powerplant and synfuel facility sites were located and screened for saline water use.

947

ABSTRACT

Accession Number:
@ 186.1
Bureau of Reclamation (Water and Power Resources Service), Feb. 1980,
Sublette project investigations, Wyoming, concluding report: 156 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: WYOMING, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 01

This report describes the Sublette Investigation, presenting results and conclusions, and preserving the study data for future use. Both present conditions and near-future needs are discussed. The area under investigation is the entire Green River Basin within Wyoming, including a large area with no outflow, known as the Great Divide Basin.

Probable future water requirements were estimated in relation to the available water supply, the relative need for major new reservoir storage was evaluated, the cost of new transbasin diversions was estimated, and new water supplies for supplemental irrigation in several local areas were investigated. Streamflow conditions of the Green River between Fontenelle and Flaming Gorge Reservoirs under various levels of development also were studied.

The study indicated a lack of need for development of new major water supplies in the basin. The growing demand for industrial water apparently can be met with existing facilities through the near future. Local needs for supplemental irrigation could be met with relatively small developments if economically feasible plans can be formulated. Unfortunately, such feasibility was not evident in this study. Additional water supply developments, however, will no doubt be needed eventually as requirements continue to increase. In view of the above circumstances, it was recommended that further investigations be delayed until it becomes evident that there are definite water supply needs beyond the capability of existing facilities.

✓ 948

ABSTRACT

Accession Number:
@ 186.2
Bureau of Reclamation, Water and Power Resources Service, Feb. 1980,
Sublette project investigations, Wyoming, concluding report,
resource base appendix: 278 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: WYOMING, CLIMATE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

The purpose of this appendix is to present and retain all of the present status information collected in the course of the Sublette Investigation. Resource data for 1975 were used to the extent possible as the base representing present status, although it was necessary to substitute some 1974 data. The resources considered to be within the scope of the study were those associated with water and related land, including minerals, population, industry, and fish and wildlife.

Water resources in the study area are relatively large, with about 1.91 million acre-feet a year flowing across the State line out of Wyoming as a 1975-level average condition. Estimates of the portion available for permanent use in Wyoming after downstream commitments under Colorado River interstate compacts are discussed in the appendix. Mineral resources are enormous, with estimated deposits of 67 billion tons of trona ore, 20 billion tons of coal, 260 billion barrels (equivalent oil) of oil shale, 1.6 billion barrels of petroleum, and 3.6 trillion cubic feet of natural gas.

This appendix is one of two, the other being Problems and Needs. In the Problems and Needs Appendix, projections of population, agricultural development, industrial activity, and water requirements to the year 2000 are presented. The main report summarizes all data and information in both appendices and discusses some of the options that are available to the people of Wyoming regarding the future uses of Wyoming's share of the Colorado River.

949

ABSTRACT

Accession Number:
@ 186.3
Bureau of Reclamation (Water and Power Resources Service), 1980,
Sublette project investigations, Wyoming, concluding report,
Problems and Needs Appendix, 91 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: WYOMING, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 01

The purpose of this appendix is to present a range of estimated future water requirements and other needs to the year 2000. Resources considered to be within the scope of the Sublette Investigation are water and related land, minerals, fish and wildlife, recreational resources, and aesthetics. This appendix is one of two, the other being Resource Data. The Resource Base Appendix is a collection of resource data for the base year of 1975. The main report summarizes all data and information in both appendixes and in addition will discuss planning alternatives as well as future considerations.

✓ 950

ABSTRACT

Accession Number:
@ 186.4
Bureau of Reclamation (Water and Power Resources Service), March 1980, Glenwood-Dotsero Springs Unit, plan of study, Colorado River water quality improvement program: 23 p. [revised Dec. 1980].

Contact: USBR - Salt Lake City (copy)

Key Categories: COLORADO, SALINITY

Access Code: 011 Use Code: 02

The Glenwood-Dotsero Springs constitute the second largest point source of salinity in the Colorado River system. The combined discharges contribute annually approximately 25,000 acre-feet of water containing over 500,000 tons of total dissolved solids.

This report presents a plan of study to identify possible means of controlling total dissolved solids contributions to the Colorado River along a 16-mile reach between its confluence with the Eagle River and the junction with the Roaring Fork River. The study will be conducted through use of a Professional Services Contract and under the multi-objective planning guidelines set forth in the Principles and Standards for planning water and land resources.

951

ABSTRACT

Accession Number:
@ 186.5
Bureau of Reclamation (Water and Power Resources Service), Aug. 1980, Potentail modifications in the eight proposed Western Colorado projects for future energy development, special report: Upper Colorado Region, 55 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: COLORADO, AVAILABLE WATER BY BSIN, PRESENT WATER USE, PROCESS WATER USE

Access Code: 000 Use Code: 01

ABSTRACT

Accession Number:
@ 187
Bureau of Reclamation (Water and Power Resources Service), May 1980, Upper Colorado resource study, Colorado and Utah, concluding report: Upper Colorado Region, Salt Lake City, 156 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: AVAILABLE WATER BY BASIN, PRESENT WATER USE, COLORADO, UTAH

Access Code: 011 Use Code: 01

This paper evaluates two potential uses of spent shale for the treatment of in-situ oil shale process waters - in-situ treatment in an abandoned retort and surface treatment by columns of spent shale. Batch and column studies were conducted using four in-situ retort waters, one gas condensate, and six spent shales. The effect of spent shale contact on the organic and inorganic carbon, conductivity,,and pH of the waters was determined and related to specific surface area of the shale and retort operating conditions.

These studies indicate that spent shale may be used to reduce the organic and inroganic carbon, conductivity, color, and odor and to elevate the pH of retort waters and gas condensate. Spent shale reduces the inorganic carbon by 47 to 98%, the organic carbon by 7 to 66%, and elevates the pH from initial levels of 8 to 9 up to 10 to 11. TOSCO II spent shale was the best absorbent for organic carbon, while Lurgi and simulated in-situ spent shales achieved the highest inorganic carbon reduction. These results suggest that a packed bed of spent shale could be placed ahead of an ammonia removal step in a retort water treatment system. The increase in pH achieved by the spent shale column would convert ammonium to ammonia which could be readily stripped. The simultaneous reduction in electrical conductivity and dissolved organic and inorganic carbon by the spent shale column would decrease the load of these constituents on subsequent treatment steps.

952

ABSTRACT

Accession Number:
@ 187.1
Bureau of Reclamation (Water and Power Resources Service), May 1980,
Ute Indian Unit, Central Utah Project, concluding report: 34 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: UTAH, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 01

The Ute Indian Unit, a participating project of the Central Utah Project, was originally proposed for the purpose of using Utah's remaining share of the Colorado River water supply. Initially, the scope of the unit included development of both Indian and non-Indian lands primarily in the Uinta and Bonneville Basins; later the scope was expanded to a statewide concept. Because most of the studies for the unit focused on development in the Uinta Basin, this report presents the results of investigations in the area.

The report concludes that it is presently neither practicable nor feasible to develop a large reclamation project to utilize Utah's remaining share of the Colorado River due to undertainties in key factors which influence such development. However, the report notes that at a future date, there may be considerable merit in developing a plan which would combine the emphasis on agriculture and on energy alternative futures.

✓ 953

ABSTRACT

Accession Number:
@ 187.2
Bureau of Reclamation (Water of Power Resources Service), March 1980, Upalco Unit, Central Utah Project, definite plan report, Upper Colorado region: Salt Lake City, 306 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: UTAH, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 01

This report presents the results of definite plan studies of the Upalco Unit of the Central Utah Project. Construction of the Central Utah Project as a participating project with the Colorado River Storage Project was authorized by the act of 1956.

The Central Utah Project consists of six units that can be constructed and operated independently. Five of the units -- the Uintah, Vernal, Jensen, Upalco, and Ute Indian Units -- are developments in the Uinta Basin of the Upper Colorado River Basin. The sixth, or Bonneville Unit, involves a diversion of water from the Uinta Basin to the Bonneville Basin and associated developments in both basins. The Upalco Unit is the fourth to come under definite plan study. The Vernal Unit is essentially completed, the Jensen and Bonneville Units are under construction, the Uintah Unit definite plan study is in progress, and a Ute Indian Unit concluding report has been completed.

The Upalco Unit would develop flows of the Lake Fork and Yellowstone Rivers, with minor contributions from other small streams such as Big Sand Wash, for irrigation of non-Indian and Indian land, municipal and industrial water use, recreation, fish and wildlife purposes, and flood control. Project irrigation water would be made available from storage regulation of surplus flows of Yellowstone and Lake Fork Rivers, from savings of excessive seepage losses through rehabilitation of existing canals, and from increased use of return flows. Municipal and industrial water would be made available from Taskeech Reservoir for use by the city of Roosevelt, Utah, and other smaller communities in the area.

954

ABSTRACT

Accession Number:
@ 187.3
Bureau of Reclamation, Oct. 1979, Central Utah Project, Bonneville Unit, municipal and industrial system, final environmental statement: v. 1, Upper Colorado regional office, Salt Lake City, Rep. INT FES 79-55.

Contact: USBR - Salt Lake City (copy)

Key Categories: UTAH, ENVIRONMENTAL

Access Code: 011 Use Code: 01

This statement describes the environmental aspects of the Municipal and Industrial (M&I) System of the Bonneville Unit of the Central Utah Project, which was authorized as a participating project of the Colorado River Storage Project Act of 1956. The M&I System would be located in Salt Lake, Utah, Summit, and Wasatch Counties in north-central Utah. The project plan would include construction of Jordanelle Reservoir and Powerplant on the Provo River, completion of two aqueducts now under construction, and modification of 15 upper Provo River reservoirs. The primary function of the M&I System would be to store and deliver M&I water to help alleviate projected shortages in the growing metropolitan Salt Lake City-Provo-Orem area through the year 2010. Its secondary functions would be to generate hydroelectric power and to eliminate existing shortages of irrigation water on agricultural lands in the Heber-Francis area of the project. Additionally, flood control would be provided and measures taken to improve recreation opportunities and some aesthetic values. Project plans would also include measures to protect the stream fishery and wildlife habitat losses that would otherwise occur with system development. The project would also provide water to accomodate part of the population and industrial growth expected in the unit area.

ABSTRACT

Accession Number:
@ 188
Bureau of Reclamation, 1978, The Colorado River -- water quality improvement program: Washington, D.C.

Contact: USBR - Denver (copy)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY

Access Code: 000 Use Code 02

9565

ABSTRACT

Accession Number:
@ 188.1
Bureau of Reclamation, Sept. 1978, Colorado River basin salinity control project, Paradox Valley Unit, definite plan report: Upper Colorado Region, 91 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: COLORADO, UTAH, SALINITY

Access Code: 011 Use Code: 02

This report presents the results of definite plan studies on the Paradox Valley Unit of the Colorado River Basin Salinity Control Project. The Paradox Valley Unit would be located in Montrose and San Miguel Counties of southwestern Colorado in the Upper Colorado River Basin. The unit would be designed to reduce the salinity of the Dolores and Colorado Rivers by pumping brine groundwater from a well field located along the Dolores River in Paradox Valley and thus preventing it from surfacing in the riverbed. This will reduce the salt load to the Colorado River by 180,000 tons.

✓ 9506

ABSTRACT

Accession Number:
@ 188.2
Bureau of Reclamation, Aug. 1977, Prediction of mineral quality of irrigation return flow: v. 11, Vernal field study: Rep. EPA-600/2-77-179B, 106 p.

Contact: NTIS (copy)

Key Categories: UTAH, COMPUTER MODELS, SURFACE WATER QUANTITY, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

This volume details the field investigations conducted to develop and validate the 'simulation model of conjunctive use and water quality for a river system of basin' as given in Volume III. The studies were conducted in Ashley Valley, near Vernal, Utah. The investigations included: the quantity and quality of groundwater, irrigation water, and return flows; crop inventory and consumptive use; soil chemistry; and hydrological units.

ABSTRACT

Accession Number:
@ 189
Bureau of Reclamation, 1976, Yellow Jacket project, Colorado, progress report, April 1976: Upper Colorado Region, Salt Lake City, Utah, 70 p.

Contact: Don Clay (copy)
USBR - Salt Lake City (copy)
BLM - Craig (loan)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 01

The Upper Colorado Resource Study initiated by the Bureau of Reclamation in January 1976, is a feasibility-level investigation covering the Yampa River Basin except the Little Snake River and Vermillion Creek sub-basins, and the entire White River Basin in Colorado and Utah. The latter portion is called the Yellow Jacket Unit, which is a continuation of earlier investigations on the Yellow Jacket Project.

The Yellow Jacket project consists of a number of alternative reservoir sites to supply irrigation, industrial, municipal, and domestic water to northwestern Colorado. The Yellow Jacket study area covers about 4,000 square miles, consisting of the entire White River drainage basin within Colorado and the adjacent Milk Creek drainage. The area includes all of Rio Blanco County and small portions of Moffat and Garfield Counties. Nine potential reservoir sites were considered; three are on the White River, one is on Milk Creek, and the remaining five are on tributaries of the White River.

Because of the broad participation on the planning team and the controversial problems that have beset the project for many years, a unified document was prepared to summarize accomplishments to date, available data, and potential sources of future action. A description of the project area is presented, including physical, biological, social, and economic factors. The problems and needs of the area, as they involve water resource development, are discussed. Six alternative plans are briefly described in Chapter IV and numerical comparisons are summarized in Chapter V.

ABSTRACT

Accession Number:
@ 190
Bureau of Reclamation, 1976, Upper Colorado resource study, Yellow Jacket Unit, Colorado: supplement to progress report of April 1976, 12 p.

Contact: Don Clay (copy)
USBR - Salt Lake City (copy)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 01

This supplement to the Yellow Jacket Progress Report of April 1976 has been prepared to present information and data which have become available since that time. The report supplement is being distributed to keep the planning team and the public informed about the latest planning developments. A new reservoir site is now proposed as a substitute for the Lake Avery enlargement plan described in the Progress Report, and several other plan modifications are suggested for consideration.

The Upper Colorado Resource Study initiated by the Bureau of Reclamation in January 1976, is a feasibility-level investigation covering the Yampa River Basin except the Little Snake River and Vermillion Creek subbasins, and the entire White River Basin in Colorado and Utah. The latter portion is called the Yellow Jacket Unit, which is a continuation of earlier investigations on the Yellow Jacket Project.

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ABSTRACT

Accession Number:
@ 190.1
Bureau of Reclamation, Oct. 1976, Lyman Project, Wyoming, definite plan report supplement, Upper Colorado Region: 83 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: WYOMING, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 01

The Lyman Project was authorized for construction as a participating project of the Colorado River Storage Project by the act of 1956 (70 Stat. 105).

This report supplements the Bureau of Reclamation's 1962 Definite Plan Report on the Lyman Project in southwestern Wyoming and presents current plans for completion of the project. It presents data on the potential Stateline Reservoir on the East Fork of Smiths Fork which is planned as a replacement for China Meadows Reservoir proposed in the 1962 report. New data on municipal and industrial water needs, fish and wildlife provisions, and recreation facilities are also included, as well as a updating of information on the Meeks Cabin Dam and Reservoir on Blacks Fork, completed in 1971 as a project feature.

ABSTRACT

Accession Number:
@ 191
Bureau of Reclamation, June 1976, State comments on critical water problems facing the eleven western states, Westwide Study Report: U.S. Government Printing Office, Washington, D.C.

Contact: USBR - Salt Lake City (copy)

Key Categories: PRESENT WATER USE, PROCESS WATER USE, SURFACE, UTAH, WYOMING, AVAILABLE WATER BY BASIN, WATER LAW, SALINITY, SEDIMENT, SURFACE WATER QUALITY

Access Code: 011 Use Code: 03

This report summarizes state comments on the Western U.S. Water Plan Study initiated in 1969. Letters from the states of Utah and Wyoming are included. The detailed report is abstracted in accession number 194.

ABSTRACT

Accession Number:
@ 192
Bureau of Reclamation, 1975, Salinity and sediment study, Upper Colorado River Basin, Utah, Colorado, Wyoming: USDI Upper Colorado Region, Salt Lake City, 80 p.

Contact: BLM - Craig (loan)

Key Categories: COLORADO, UTAH, WYOMING, SALINITY, SEDIMENT

Access Code: 102 Use Code: 02

This report, including maps, describes the ranges of soil salinity and sediment yield characteristics on National resource lands in three States--Utah, Colorado, and Wyoming--within the Upper Colorado River Basin. The main object of this study and report is to determine the natural diffuse sources of salinity of soils on lands administered by the Bureau of Land Management in the Upper Colorado River basin.

Project II

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ABSTRACT

Accession Number:
@ 192.1
Bureau of Reclamation, Dec. 1975, Jensen Unit, Central Utah Project, definite plan report, Upper Colorado region, 131 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: UTAH, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 02

This report presents the results of definite plan studies of the Jensen Unit of the Initial Phase of the Central Utah Project. The Initial Phase is a segment of the Central Utah Project that can be constructed and operated independently. For programming and other considerations the Initial Phase has been divided into four units. Three of these, the Jensen, Vernal, and Upalco Units, are developments in the Uinta Basin of the Upper Colorado River Basin. The fourth or Bonneville Unit involves a diversion of water from the Uinta Basin to the Bonneville Basin and associated developments in both basins. The Jensen Unit is the last of four units to come under definite plan study. The Jensen Unit will provide municipal and industrial water (18,000 ac. ft./yr) to augment existing supplies, and water for irrigation (4,600 ac. ft./yr) in the vicinity of Jensen. It will also benefit fish and wildlife, recreation, and flood control. Future municipal and industrial water requirements are based in part on an expected population boom from oil shale development.

ABSTRACT

Accession Number:
@ 193
Bureau of Reclamation, April 1975, Executive summary of critical water problems facing the eleven western states, Westwide Study: U.S. Government Printing Office, Washington, D.C., 85 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: PRESENT WATER USE, PROCESS WATER USE, SURFACE, COLORADO, UTAH, WYOMING, AVAILABLE WATER BY BASIN, WATER LAW, SALINITY, SEDIMENT, SURFACE WATER QUALITY, SALINITY, SEDIMENT

Access Code: 011 Use Code: 02

This report summarizes the results of the Western U.S. Water Plan Study initiated in 1969. The volume overviews the main report which is abstracted in accession number 194.

ABSTRACT

Accession Number:
@ 194
Bureau of Reclamation, April 1975, Westside study report on critical water problems facing the eleven western states: U.S. Government Printing Office, Washington, D.C., 457 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: PRESENT WATER USE, PROCESS WATER USE, SURFACE, COLORADO, UTAH, WYOMING, AVAILABLE WATER BY BASIN, WATER LAW, SALINITY, SEDIMENT, SURFACE WATER QUALITY, SALINITY, ENVIRONMENTAL

Access Code: 011 Use Code: 01

This report summarizes the results of the Western U.S. Water Plan Study initiated in 1969, and it discusses critical water problems facing the 11 western states. The report presents background information on the economy, natural resources, environment, and land and water resources, and it identifies trends and concepts which will affect the future of the West in terms of requirements for water and related lands and environment and quality of life. It also presents quantitative data and analyses on critical water-related problems which are common to the regions, or specific to a state or basin. Problems identified as having high priority are those related to the needs for water services, water supplies necessary to satisfy the objective of Indian self-determination, and water and plans for the maintenance and improvement of the quality of the environment. In determining possible solutions to these and other future water needs, emphasis has been given to total water management, including water reuse and recycling and improvement of water system efficiency.

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ABSTRACT

Accession Number:
@ 194.1
Bureau of Reclamation, Feb. 1974, Water for tomorrow, Colorado state water plan, Phase I appraisal report on water and related land resources and their present utilization: report prepared in cooperation with the State of Colorado, 120 p.

Contact: Bob Owen (loan)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 002 Use Code: 03

This Appraisal Report summarizes Phase I of the investigations to develop a long range Statewide water plan for Colorado. This report presents a compilation of statistical data on an inventory of the water and related natural resources of the State and current status of development and use of these resources. The data are presented in this report by the State's four major river basins - Arkansas, Colorado, Missouri, and Rio Grande. The base year for compilation of data is 1970. Data compiled for earlier years were used only when 1970 data were unavailable. No projections of future conditions are included.

ABSTRACT

Accession Number:
@ 195
Bureau of Reclamation, Sept. 1974, Alternative sources of water for prototype oil shale development, Colorado and Utah: Upper Colorado Region, Salt Lake City, Utah, 114 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: COLORADO, UTAH, PROCESS WATER USE, WATER LAW, AVAILABLE WATER BY BASIN, SURFACE,

Access Code: 011 Use Code: 01

This report identifies specific alternative sources of water for use in the prototype oil shale developments at federal lease tracts C-a, C-b, and U-a, and U-b. The report overviews the water requirements for development of these four tracts by surface retorting methods. Five existing reservoirs in Colorado and Utah are considered as sources for water for the oil shale industry. They are Blue Mesa, Green Mountain, and Ruedi Reservoirs in Colorado and Flaming Gorge and Starvation Reservoirs in Utah. The report also considers water available from a number of single-purpose and multiple-purpose developments including direct pumping from the Colorado River, Yellow Creek and Ripple Reservoirs, and groundwater. Development plans, major features, costs, and summary environmental effects are also presented for such multiple-purpose developments as the Yellow Jacket Project and the Dominguez Reservoir. Water rights and priorities and procedures for contracting with the United States for water service are discussed as they relate to water supply development for these federal lease tracts.

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ABSTRACT

Accession Number:
@ 195.1
Bureau of Reclamation, Aug. 1973, Central Utah Project, Bonneville Unit, final environmental statement: 702 p. plus appendix A.

Contact: USBR - Salt Lake City (copy)

Key Categories: UTAH, ENVIRONMENTAL

Access Code: 011 Use Code: 01

The Bonneville Unit is part of the Central Utah Project's initial phase, which was authorized for construction as a participating project with the Colorado River Storage Project by the Act of 1956. It includes developments in both the Uinta and Bonneville Basins with a diversion of Uinta Basin water to the Bonneville Basin. All or part of 12 Utah counties would be involved in the Unit. Features would include ten new reservoirs and enlargement of two existing reservoirs; 140 miles of aqueducts, tunnels, and canals; three powerplants; nine pumping plants; 13 miles of dike; and 200 miles of pipe drains.

The Unit would develop water for irrigation, municipal and industrial needs, and power production; and would provide recreation, fish and wildlife, flood control, water quality control, and area redevelopment benefits. The developed water supply would fulfill the project objective of supplying immediate and projected water needs. Construction of the Unit began in March 1967 and is about 16 percent completed, including two major dams and about 7 miles of tunnel and aqueduct. About 21 years would be required to complete all proposed features.

Construction and operation of the Bonneville Unit would cause significant changes in the natural environment of the area. In 11 Uinta Basin streams there would be a reduction of flows in about 100 miles of waterway, sometimes below minimums suggested by fishery biologists. Construction of some features would cause extensive land distrubance and would permanently alter existing esthetics. Salinity of the water increased (1) by diversion to Bonneville Basin and increased consumptive use in Uinta Basin which would deplete the river supply and (2) by increased salt load of return flows in the Uinta Basin. Recreational use of National Forest land would increase as a result of improved access and additional facilities provided by Unit development.

The Bonneville Unit would facilitate continued industrial and population growth in the Wasatch Front portion of the Bonneville Basin. Attendant to the growth would be an increase in social and pollution problems related to population concentration. Distribution of water by the Unit could also influence growth and development of other areas of the State, particularly the Sevier River and Uinta Basins.

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ABSTRACT

Accession Number:
@ 196.1
Bureau of Reclamation, Dec. 1972, Seedskadee Project, Wyoming,
definite plan report: Upper Colorado region, Salt Lake City, 72 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: WYOMING, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 02

The plan of development outlined in this report provides for operation of the existing Fontenelle Reservoir on the Green River for multiple purposes, including municipal and industrial use, Phase I of irrigation development, hydroelectirc power production, fish and wildlife development, recreation, and flood control. Emphasis in the report is placed on the irrigation development, particularly the financial and economic aspects of such development, since most of the future project costs will be for irrigation and also since a decision for or against irrigation development is needed to determine the course of future project studies and the amount of water ultimately available for municipal and industrial use.

Development of the Seedskadee Project to date consists of the 345,000-acre-foot Fontenelle Reservoir on the Green River, the 10-megawatt Fontenelle Powerplant, some basic recreational facilities around the reservoir shoreline, and initial developments at the Seedskadee National Wildlife Refuge. The reservoir is operated primarily for hydroelectric power production and flood control with consideration also given to the downstream stream fishery and the wildlife refuge.

Plans for the Seedskadee Project described in the report include increased utilization of the water supplies at Fontenelle Reservoir. Municipal and industrial water will be provided to the State of Wyoming for marketing by the State to water users. Irrigation water will be provided to 9,720 acres of full service land under the West Side Canal as Phase I of project irrigation. Water also will be provided for continued development of the Seedskadee National Wildlife Refuge and minor consumptive uses associated with recreational facilities around Fontenelle Reservoir. Hydroelectric power will be produced at the existing Fontenelle Powerplant but power production will be subordinated to other project purposes. Control of flood flows will be continued.

9652

ABSTRACT

Accession Number:
@ 196.2
Bureau of Reclamation, May 1972, Alternative plans for water resource development, Green River basin, Wyoming, special report: Region 4, Salt Lake City, Utah.

Contact: USBR - Salt Lake City (copy)

Key Categories: WYOMING, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 02

This report presents alternative plans for development of the water resources of the Green River Basin in Wyoming. Its purpose was to provide information useful to Wyoming in the formulation of its State Water Plan and for others who are actively interested in further development of water and water-related resources of the Green River Basin. The report presents a number of alternative plans which, together with presently authorized or otherwise committed projects, would meet many water needs for the next 50 years.

9603

ABSTRACT

Accession Number:
@ 196.3
Bureau of Reclamation, April 1972, Yellow Jacket project, Colorado, feasibility report: USBR Region 4, Salt Lake City, Utah, [unpublished report].

Contact: USBR - Grand Junction (loan)
BLM - Craig (loan)

Key Categories: COLORADO, AVAILABLE WATER, PRESENT WATER USE

Access Code: 122 Use Code: 02

The Yellow Jacket project was designed to supply irrigation, industrial, municipal, and domestic water to northwestern Colorado. The study area covers about 4,000 square miles, consisting of the entire White River drainage basin within Colorado and the adjacent Milk Creek drainage. The area includes all of Rio Blanco County and small portions of Moffat and Garfield Counties.

Feasibility investigations for the Yellow Jacket Project were initiated by the Bureau of Reclamation in 1961. The investigations begun in 1961 resulted in a feasibility report dated October 1968 (Abstract No. 199). The report recommended development of local water supplies for irrigation and industrial uses, as shown in the following table, and provisions for fish and wildlife and recreational facilities. Acquisition of private land in the the Oak Ridge area, east of Meeker, for management as big game range by the State of Colorado was proposed. Lack of agreement on the big game recommendations led to reformulation of the project plan and a second feasibility report dated April 1972 (Abstract 200). The 1972 report recommended less irrigation, more industrial water, and a strong fish and wildlife program, including easements, land acquisition, landowner agreements, and big game habitat improvement in the Little Beaver-Oak Ridge area on public domain as well as acquired land. In spite of previous compromises and tentative agreements, there remained a lack of unanimity among the landowners, State and Federal wildlife agencies, and other interested parties. Future reports in 1976, led to additional changes (Abstract Nos. 189, 190).

964

ABSTRACT

Accession Number:
@ 196.4
Bureau of Reclamation, Aug. 1971, Bluestone Project, Colorado:
feasibility report, Region 4, Salt Lake City, Utah, 143 p.

Contact: Colorado Water Conservation Board (copy)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 02

This report is a feasibility study on the Bluestone Project in westcentral Colorado. The report outlines a plan for development of areas along Roan Creek near DeBeque and in Sharrard Park near Rifle. It also presents a plan for a storage and power development at the Una site on the Colorado River between the Roan Creek and Sharrard Park areas which has been investigated in reconnaissance scope as a possible project extension. The project would supply about 61,000 acre-feet/year of municipal and industrial water at an estimated cost (1971 dollars) of $13.80.

No 198

ABSTRACT

Accession Number:
@ 197
Bureau of Reclamation, June 1971, Savery-Pot Hook project, Colorado and Wyoming, definite plan report: USBR, Region 4, Salt Lake City, Utah, 104 p. [revised Jan. 1972]

Contact: USBR - Salt Lake City (copy)

Key Categories: COLORADO, WYOMING, AVAILABLE WATER, PRESENT WATER USE, FLOODS

Access Code: 011 Use Code: 02

Construction of the Savery-Pot Hook Project as a participating project of the Colorado River Storage Project was authorized by Public Law 88-568 of 1964. This report presents the results of definite plan studies made since the project was authorized. These studies confirmed the general plan of the feasibility report with some modifications.

Unused flows of Little Snake River and its tributaries, Savery Creek from the north and Slater and Willow Creeks from the south, will be developed for irrigation, recreation, and fish and wildlife. Flood control also will be provided. The project will generally be compatible with the environment of the area.

Storage regulation will be provided in Savery Reservoir on Savery Creek in Wyoming and in Pot Hook Reservoir on Slater Creek in Colorado. Releases from the reservoirs and usable natural and return flows will be diverted by new and existing canals and ditches. New canals will include the Dolan Mesa Canal heading on Savery Creek and the Pot Hook Canal heading at the Pot Hook Reservoir. Two major laterals will branch from the Pot Hook Canal. New lateral systems will be constructed for full irrigation service lands. Drains will be constructed as needed.

Dead and inactive storage will be available in both Savery and Pot Hook Reservoirs for fishing and recreation, and minimum flows for fish will be maintained in Savery Creek. Recreational facilities will be constructed at both Savery and Pot Hook Reservoirs. Range lands below the project will be improved as wildlife habitat to compensate for habitat lost through inundation of reservoir basins and irrigation of new lands.

ABSTRACT

Accession Number:
@ 199
Bureau of Reclamation, 1968, Yellow Jacket project, Colorado,
feasibility report Oct. 1968: Region 4, Salt Lake City, Utah
[unpublished report].

Contact: USBR - Grand Junction (loan)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 122 Use Code: 02

The Yellow Jacket project was designed to supply irrigation, industrial, municipal, and domestic water to northwestern Colorado. The study area covers about 4,000 square miles, consisting of the entire White River drainage basin within Colorado and the adjacent Milk Creek drainage. The area includes all of Rio Blanco County and small portions of Moffat and Garfield Counties.

Feasibility investigations for the Yellow Jacket Project were initiated by the Bureau of Reclamation in 1961. The investigations begun in 1961 resulted in a feasibility report dated October 1968 (Abstract No. 199). The report recommended development of local water supplies for irrigation and industrial uses, as shown in the following table, and provisions for fish and wildlife and recreational facilities. Acquisition of private land in the the Oak Ridge area, east of Meeker, for management as big game range by the State of Colorado was proposed. Lack of agreement on the big game recommendations led to reformulation of the project plan and a second feasibility report dated April 1972 (Abstract 200). The 1972 report recommended less irrigation, more industrial water, and a strong fish and wildlife program, including easements, land acquisition, landowner agreements, and big game habitat improvement in the Little Beaver-Oak Ridge area on public domain as well as acquired land. In spite of previous compromises and tentative agreements, there remained a lack of unanimity among the landowners, State and Federal wildlife agencies, and other interested parties. Future reports in 1976, led to additional changes (Abstract Nos. 189, 190).

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ABSTRACT

Accession Number:
@ 199.1
Bureau of Reclamation, Jan. 1966, Summary of potential water resource developments in the Upper Colorado River basin of Colorado: Region 4, Salt Lake City, Utah, 11 p.

Contact: Colorado Water Conservation Board (copy)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN

Access Code: 011 Use Code: 03

This report describes potential water resource developments in the Colorado River Basin. The report presents an inventory of potential developments, with no attempt to indicate a desirable order of construction. Eight projects (West Divide, Ruedi Reservoir, Yellow Jacket, Bluestone, Una Reservoir, Flattops, Red Cliff, and Azure) which could supply a total of 500,000 acre-feet of water annually for oil shale, are identified.

96b

ABSTRACT

Accession Number:
@ 199.2
Bureau of Reclamation, March 1966, West Divide Project, Colorado
feasibility report: Region 4, Salt Lake City.

Contact: USBR - Salt Lake City (copy)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 02

The West Divide project is planned primarily to provide water for irrigation and for municipal and industrial use in connection with development of local oil shale reserves. It also would provide benefits to recreation, fish and wildlife, and flood control.

Project water would be obtained from a series of Colorado River tributaries south of the river. Crystal River flows would be regulated at Placita Reservoir. Some reservoir releases would be made directly to the river for downstream uses. Most of the releases, however, would be diverted into the Huntsman Canal and conveyed westward to West Divide Creek for subsequent distribution in the western portion of the project area by the East and WEst Divide Canals. The diverted flows would be supplemented by water stored in Haystack Reservoir on small tributaries of West Divide Creek. Natural flows at Haystack Reservoir would be augmented by flows of nearby streams diverted by feeder canal. Yank Creek Reservoir would be constructed on North Thompson Creek to meet project needs in the eastern portion of the project area. Releases from this reservoir would be distributed by the Fourmile Canal. Irrigation lateralas would be constructed from the main project canals, and drains would be provided as needed. Municipal and industrial water would be made available for sale in the Colorado River and in the West Divide and Fourmile Canals. Facilities for reregulation, distribution, and treatment of the municipal and industrial supply would be provided by the Forest Service at all project reservoirs since the reservoirs would be within National forest boundaries.

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967

ABSTRACT

Accession Number:
@ 200.1
Bureau of Reclamation, Dec. 1962, Ruedi-Western Slope investigation, Colorado, reconnaissance reports on Basalt and Bluestone Projects: region 4, Salt Lake City, 104 p.

Contact: USBR - Salt Lake City

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 02

This report presents a reconnaissance appraisal of the Basalt and Bluestone projects in Colorado's western slope. These two projects would utilize water of the Ruedi Reservoir which was authorized to be constructed on the Fryingpan River, a tributary of the Roaring Fork River which in turn enters the Colorado River near Glenwood Springs, Colorado. The Ruedi Dam would have been an earthfill structure rising 270 feet above streambed. It would have created a reservoir of about 100,000-acre-foot capacity, covering an area of 1,000 acres.

The Ruedi Reservoir was a feature of the Fryingpan-Arkansas project, authorized by the Act of July 16, 1962 (Public Law 87-590). The primary purpose of that project was to divert water eastward through the Continental Divide from the Colorado River Basin for multiple-purpose use in the Arkansas River Basin in Colorado. The Ruedi Reservoir was included in the project to provide replacement storage for existing water uses on the western slope and to provide additional storage to serve future water resource developments in that area.

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ABSTRACT

Accession Number:
@ 200.2
Bureau of Reclamation, Dec. 1961, Silt Project, Colorado, definite plan report: Region 4, Salt Lake City, 54 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 02

This report presents the results of definite plan studies of the Silt Project in the Colorado River Basin in west-central Colorado. The Silt project is located near the towns of Rifle and Silt in Garfield County. The project will provide for regulation of the flow of Rifle Creek and for pumping from the Colorado River for the irrigation of 6,597 acres of land, including 2,118 acres not presently irrigated, 4,160 acres in need of supplemental water, and 319 acres in need of a new source of water. It will also provide benefits to fish and wildlife and recreation. Rifle Creek water will be regulated at the 12,650-acre-foot Rifle Gap Reservoir to be formed by a dam across the creek channel. Part of the stored water will be released from the reservoir into the Davie ditch, presently abandoned, which will be reconstructed to serve lands on Davie Mesa. The remaining stored water will be released to Rifle Creek, replacing natural flows presently used on downstream lands. The replacing natural flows will be diverted from East Rifle Creek into the existing Grass Valley Canal and used for irrigation of new and supplemental service lands in Dry Elk Valley and on Harvey Mesa. The Dry Elk Valley lateral will be constructed to distribute part of the water from the Grass Valley Canal. Some water will be pumped from the Colorado River at the proposed 32-second-foot capacity Silt Pumping Plant and conveyed in the Silt Pump Canal to lands on the lower portion of Harvey Mesa. Part of the water from the Grass Valley Canal and Harvey Gap Reservoir presently used on these lower lands will thus be freed for use as an additional supply for lands above the pump canal. In order to conserve water for project use the irrigators will limit early-season diversions and will discontinue irrigation diversions outside of the irrigation season. Land drains will be constructed as necessary. Basic recreational facilities will be provided at the Rifle Gap Reservoir. The reservoir will provide moderate fishing benefits and the project will be beneficial to waterfowl.

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ABSTRACT

Accession Number:
@ 200.3

Bureau of Reclamation, Feb. 1957, Yampa-White project, Colorado, Utah, and Wyoming, reconnaissance report: Region 4, Salt Lake City, Utah.

Contact: USBR - Grand Junction (loan)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 122 Use Code: 03

This report describes and appraises the potential Yampa-White project which consists of seven separate units. Five of the units--the Wessels, Hayden Mesa, Great Northern, Juniper, and Two Bar--are in the Craig division of the project while the Yellow Jacket and Flattops units are in the Meeker division. To provide a complete picture of potentialities for use of the local water supply, the report also outlines possible developments in the Yampa-White project area not considered as units of the project and in addition outlines possible diversions from the area that would compete for some of the project water supply.

One unit of the Yampa-White project, the Flattops, would be a municipal water and hydroelectric power development. All the other units would be primarily irrigation developments, but some could be adapted to power production and nearly all would incidentally benefit fish and wildlife conservation, recreation, and sediment control. The various units are essentially independent of each other and any one unit could be undertaken independently of the others.

ABSTRACT

Accession Number:
@ 201
Bureau of Reclamation, and Office of Water Research and Technology
1976, Water resources research in the lower Colorado River basin, 1972-1976.

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, SALINITY

Access Code: 000 Use Code: 02

120 202

ABSTRACT

Accession Number:
@ 203
Bureau of Water Pollution Control, 1981, Utah state strategy for salinity control in the Colorado River basin: draft, Division of Environmental Health, Utah Dept. of Health.

Contact: Utah Department of Health (copy)

Key Categories: SALINITY, UTAH

Access Code: 011 Use Code: 02

The purpose of this draft Utah State Strategy document is to provide an outline of activities of state and local agencies which assist in control of salinity within Utah's portion of the Colorado River basin.

Two major sections make up the main body of this strategy document. The State Strategy Activities section is a discussion and description of functions performed by various agencies (under each of the activity headings shown in the Index) which contribute to a coordinated state salinity control effort. There is no attempt to include details of the basin-wide or federal actions and projects contained in the Forum Plan.

The Coordination of Strategy Activities section contains a brief statement of the strategy activities of each involved agency. It also contains a display of the names, addresses and telephone numbers of the various agency personnel who are responsible for the functions their agency performs in the total state strategy.

970

ABSTRACT

Accession Number:
@ 203.1
Bureau of Water Pollution Control and Utah Division of Water
Resources, June 1981, Utah state strategy for salinity control in
the Colorado River basin: draft report dated June 16, 1981.

Contact: Jerry Riding (copy)

Key Categories: SALINITY, UTAH

Access Code: 011 Use Code: 02

This Utah State Strategy document provides an outline of activities of state and local agencies which assist in control of salinity within Utah's portion of the Colorado River Basin. The report consists of two major sections. The "State Strategy Activities" section is a discussion and description of functions performed by various agencies which contribute to a coordinated state salinity control effort. This section discusses water quality monitoring, management planning, and implementation; NPDES discharge permits; facilities planning and design; dredge and fill permits; oil and gas well discharges; solid and hazardous waste management; and spills-emergency response. The "Coordination of Strategy Activities" section contains a brief statement of the strategy activities of each agency involved and a list of names and addresses of agencies involved in salinity control.

ABSTRACT

Accession Number:
@ 204
Burke, H.D., and Vlachos, E.C., 1974, Regional oil shale study, environmental inventory, analysis and impact study, Piceance Creek basin in Rio Blanco and Garfield Counties, Colorado: Boulder, Colorado, Thorne Ecological Institute, 73 p.

Contact: Colorado State Library (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY, ENVIRONMENTAL

Access Code: 011 Use Code: 02

This report summarizes a field study by Thorne Ecological Institute that resulted in 26 technical papers as well as current literature relating to selected components of the environment and the probable effects of various alternatives of oil shale development upon those components.

The study is one of four comprising the Regional Oil Shale Study authorized and administered by the Department of Natural Resources of the State of Colorado.

The objectives of the Environmental Inventory Analysis and Impact Study were (1) to examine a number of the more sensitive components of the ecosystem and to establish baselines from which changes in the environment due to oil shale development could be evaluated and (2) to evaluate the effects of a series of alternatives and the long-range consequences for all interrelated aspects of physical and human environments.

9741

ABSTRACT

Accession Number:
@ 204.1
Butler, D.L., 1981, Springflow monitoring, Parachute Creek and Roan Creek drainage basins: in Water-resources investigations of the U.S. Geological Survey - fiscal year 1981, U.S. Geological Survey Open-File Report 81-150, p. 103.

Contact: Dave Butler (status)

Key Categories: COLORADO, SPRINGS, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

The purpose of this program is to define the relationship of springs to groundwater recharge, to aquifers, and to groundwater quality in the Parachute and Roan Creek drainage basins. Information on 286 springs in the area previously inventoried will be evaluated and about 50 of them will be selected for monitoring of discharge, temperature, and conductance. Seepage runs will be conducted in the lower stream reaches to determine the relationship between streamflow and the groundwater in the underlying alluvium.

ABSTRACT

Accession Number:
@ 205
Butler, E., and Cruff, R.W., 1971, Floods of Utah, magnitude and frequency characteristics through 1969: U.S. Geological Survey Open-File Report.

Contact: Open-File Services Section (copy)

Key Categories: UTAH, FLOODS

Access Code: 002 Use Code: 02

The main purpose of this report is to present a method for estimating the magnitude and frequency of floods on gaged or ungaged streams in Utah. A second purpose is to provide a tabulation of flood-frequency data for the stream-gaging stations used in the determination. It was prepared in cooperation with the Utah State Department of Highways.

This report utilizes streamflow records collected to 1968 for continuous-record stations and to 1969 for partial-record stations. Also included are records for continuous-record stations that were not used in previous studies.

The area covered by this report is the State of Utah and the entire Bear River basin (Utah, Idaho, and Wyoming).

BLM Library
Denver Federal Center
Bldg. 85, OC-521
P.O. Box 25047
Denver, CO 80225

ABSTRACT

Accession Number:
@ 206

Butler, E., and Marsell, R.E., 1972, Cloudburst floods in Utah, 1939-69: Utah Department of Natural Resources, Cooperative-Investigations Report No. 11, 103 p. plus plate.

Contact: USGS - Salt Lake City (copy)

Key Categories: FLOODS, CLIMATE, UTAH

Access Code: 011 Use Code: 01

This report describes the character and distribution of cloudburst floods in Utah during 1939-69. The floods documented in this report are primarily those caused by intense rain. The study was made during August 1969-December 1971 by the U.S. Geological Survey in cooperation with the Utah Department of Natural Resources, Division of Water Resources.

This report provides a general discussion of climate and summary of data on rainfall intensities. General statistics on cloudburst floods are presented, including the number by year for each city/town experiencing them and the number of floods by month. The cause of these floods is discussed and some of the more outstanding floods are described. Abstracts of accounts of individual floods are also provided.

During 1939-69, 836 cloudburst floods were reported in Utah. The largest number was in 1965, when 88 floods were reported; 63 floods were reported in 1968, and 56 were reported in 1961. The smallest number of floods reported was three in 1944. In 1942, 1948, and 1950, six floods were reported each year. About 5% of the total number of floods recorded in the period 1939-69 occurred in Uintah and Duchesne counties.

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ABSTRACT

Accession Number:
@ 208
Butler, E., Reid, J.K., and Berwick, V.K., 1966, Magnitude and frequency of floods in the United States, part 10, the Great basin: U.S. Geological Survey Water-Supply Paper 1684.

Contact: Public Inquiries Office (copy)

Key Categories: WYOMING, UTAH, FLOODS

Access Code: 002 Use Code: 02

The probable magnitude of floods of any recurrence interval between 1.1 and 50 years for any stream in the Great Basin can be determined by methods presented in this report.

The Great Basin comprises nearly all of Nevada, western Utah, eastern California, and parts of Idaho, Oregon, and Wyoming. The physiography of the basin is a series of mountain ranges and desert valleys, which trend in a north-south direction. Extreme variations in climate from arid to humid are attributed to the mountains, which, in general, are at right angles to the prevailing westerly winds. The area is subject to cloudburst floods and mud-rock flows, and this situation often results in high rates of runoff and heavy erosion from small drainage basins. The greater part of the basin is desert, and because of the paucity of flood data, the flood characteristics are poorly defined.

Two sets of curves are provided for estimating the magnitude and frequency of floods: (1) curves that represent the ratio of a flood of any frequency to the mean annual flood, and (2) curves that relate the mean annual flood to the size of the drainage basin and, where significant, to the mean altitude of the basin. Using these curves, a flood of a selected frequency can be determined for any site within the range of the base data. Separate 50-year flood graphs are shown for most of the larger rivers that are affected by regulation or diversion.

The report also contains station descriptions and lists of peak discharges for 364 gaging stations at which flood records have been collected for 5 or more years.

972

ABSTRACT

Accession Number:
@ 208.1
Butson, K.D., and Hatch, W.L., 1979, Selective guide to climatic data sources, National Oceanic and Atomospheric Administration, key to meteorological records documentation: no. 4.11, Washington, D.C., 142 p.

Contact: National Climatic Center (copy)

Key Categories: COLORADO, WYOMING, UTAH, CLIMATE

Access Code: 011 Use Code: 01

This guide is designed to assist potential users of climatological data by informing them of the availability of such data in published and unpublished form. It is arranged to indicate the publication(s) in which these data in their various climatological categories (temperature, precipitation, wind, atmospheric pressure, humidity, etc.), may be found. A brief review of the pertinent historical facts associated with each publication is given where appropriate. The various climatological tables, charts, and graphs included in each publication are listed, and in many cases abbreviated examples are shown.

973

ABSTRACT

Accession Number:
@ 208.2
Cameron Engineers, Inc., March 1975, A comprehensive planning study of water resources development and management for the Naval Oil Shale Reserves 1 and 3: Denver, Colorado, report prepared for the Dept. of the Navy, 48 p. plus appendices.

Contact:

Key Categories: COLORADO, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 02

This report presents the results of a study to assess the development and management of water resources for the Naval Oil Shale Reserves Nos. 1 and 3.

The Section I of the report briefly reviews the present state of knowledge of the water situation in Colorado oil shale country and discusses the water requirements of a hypothetical oil shale industry. Section II presents data on the hydrophysiography obtained from analyses of maps and aerial photographs. Section III reports on existing surface and subsurface hydrologic information and summarizes the results of a water balance. Section IV outlines options to acquire adequate water supplies for oil shale development, and Section V presents a plan for water resources development and related hydrologic work to be completed in advance of or in conjunction with pre-engineering studies and baseline studies. Section VI describes a detailed hydrologic data acquisition program. The appendices present two reports prepared by outside consultants: (1) Estimated Average Annual Water Balance for the Naval Oil Shale Reserve No. 1 Watersheds by R.J. Sullivan and I.F. Wymore and (2) Water Availability Study -- Naval Oil Shale Reserves No. 1 and 3 by Leonard Rice Consulting Water Engineers.

ABSTRACT

Accession Number:
@ 209
Campbell, D.L., 1977, Electrical soundings near Yellow Creek, Rio Blanco County, Colorado: Journal Research U.S. Geological Survey, v. 5, no. 2, March-April 1977, p. 193-205.

Contact: Dave Campbell (copy)

Key Categories: COLORADO, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 03

Ten vertical electrical soundings were made in the Piceance Creek Basin in October 1974 - 5 along Yellow Creek, 2 in Big Duck Creek, and 1 each along Corral Gulch, on the hill in sec. 20, 1 kilometer northwest of 84 Ranch, and along the White River between the mouths of Yellow and Piceance Creeks. Interpretations of these soundings indicate that the anisotropy of the upper oil shales decreases from 2 in the basin center to 1 at a location on its flank. This decrease could result from a greater number of vertical water-filled fractures on the upper shales near the edge of the basin. On the other hand, the anisotropy coefficient for the lower shales increases from 2 to around 9 along the same section, indicating the presence of an increasing number of isolated horizontal aquifers in the lower shales reverses nearer the basin edge in the area of recharge of these splintered horizontal aquifers.

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ABSTRACT

Accession Number:
@ 209.1
Campbell, D.L., and Olhoeft, G.R., 1977, Laboratory measurements of complex resistivity characteristics of oil shales from Saterdal No. 1 corehole, Piceance Creek basin, Colorado: U.S. Geological Survey Open-File Report 77-410, 13 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 02

Laboratory measurements of the complex electrical resistivity characteristics of more than 120 oil shale samples from Saterdal #1 corehole, Piceance Creek Basin, Colorado, indicate the following: (1) The presence of kerogen in wet Green River Formation marls increases their d.c. resistivities from about 300 ohm-m to more than 10^5 ohm-m, makes them isotropic, and causes a substantial frequency dependence. (2) Microanisotropy coefficient increases with water content from about 2 to as much as 200. The effect seems to be due to an extreme porosity and/or permeability anisotropy, involving a drop in longitudinal resistivity from about 10^8 ohm-m for dry samples to as low as 10^5 ohm-m for wet ones, while transverse resistivities stay relatively constant at about 10^8 ohm-m. (3) Intermediate grade oil shales show the most extreme anisotropy effect; both very rich and very lean oil shales are more nearly isotropic. (4) Both wet and dry oil shales show a pronounced frequency effect for frequencies >10Hz, and may make good IP targets.

ABSTRACT

Accession Number:
@ 210
Carlson, D.D., and Green, S.L., 1979, Water-resources investigations of the U.S. Geological Survey in Wyoming, fiscal year 1979: Open-File Report 79-1278, 115 p.

Contact: USGS - Cheyenne (copy)
Open-File Services Section (copy)

Key Categories: SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, WYOMING

Access Code: 011 Use Code: 01

The purpose of this report is to describe the water-resource work being done in Wyoming.

The U.S. Geological Survey, in cooperation with the State of Wyoming, the city of Cheyenne, and other Federal agencies, has five data-collection activities and 31 water-resource appraisal projects in Wyoming during fiscal year 1979 (October 1, 1978, through September 30, 1979).

The data-collection activities include: (1) Collection of records for streamflow and reservoir storage; (2) measurements of water levels in wells; (3) sampling and chemical analysis of water from streams and wells; (4) sampling and sediment analysis of surface water; and (5) collection of peak-flow information at partial-record sites. This report contains tables of monitoring sites for these five data-collection activities.

Water resource appraisal projects described in the report include the projects currently being conducted during fiscal year 1979 and projects completed in previous fiscal years, but for which final reports are in preparation.

ABSTRACT

Accession Number:
@ 211
Carpenter, A.P., 1978, Characterization of carbonaceous spent shale and shale oil derived from the TOSCO II retort of Green River oil shale: Ph.D. Dissertation, University of Massachusetts, Cambridge, Mass., 185 p.

Contact: University Microfilms International (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 03

This thesis presents the results of a laboratory study to characterize spent shale and shale oil from the TOSCO II process. Modern instrumental techniques were used to identify mineral phases, to quantitate the concentration of major elements and to identify the solvent-extractable organic compounds.

ABSTRACT

Accession Number:
@ 212
Carroll, R.D., Coffin, D.L., Ege, J.R., and Welder, F.A., March 1967, Preliminary report on Bureau of Mines Yellow Creek Core Hole No. 1, Rio Blanco County, Colorado: U.S. Geological Survey, Report TEI-869, 36 p.

Contact: USGS Library (loan)

Key Categories: GROUNDWATER QUANTITY, COLORADO

Access Code: 142 Use Code: 02

Analysis of geologic, hydrologic, and geophysical data obtained in and around Yellow Creek core hole No. 1, Rio Blanco County, Colorado, indicate a 1,615-foot section of oil shale was penetrated by the hole. Geophysical log data indicate the presence of 25 gallons per ton shale for a thickness of 500 feet may be marginal. The richest section of oil shale is indicated to be centered around a depth of 2,260 feet. Within the oil shale the interval 1,182 to 1,737 feet is indicated to be relatively structurally incompetent and probably permeable. Extension of available regional hydrologic data indicate the oil shale section is probably water bearing and may yield as much as 1,000 gallons per minute. Hydrologic testing in the hole is recommended.

ABSTRACT

Accession Number:
@ 213
Carroon, L.E., 1970, Correlative estimates of streamflow in the Upper Colorado River basin: U.S. Geological Survey Water-Supply Paper 1875.

Contact: Public Inquiries Office (copy)

Key Categories: COLORADO, WYOMING, UTAH, SURFACE WATER QUANTITY

Access Code: 100 Use Code: 02

975

ABSTRACT

Accession Number:
@ 213.1
Carter, J., 1976, Energy resources development, (Colorado River basin): in Peterson, D.F., and Crawford, A.B., Values and choices in the development of the Colorado River basin, Tucson, University of Arizona Press, p. 144-155.

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 03

Projections for future energy needs have led to increased interest in the energy resources of the Colorado River Basin. Accordingly, the U.S. Department of the Interior has created an energy policy for future development by encouraging coal and oil shale technology and resources data through leasing programs and R&D projects. Although solar, geothermal, coal, and oil shale development of the area is expected, it is the author's contention that these efforts, along with conservation programs, will not greatly alter the energy situation sufficiently to avoid an increased dependence on foreign sources by 1980. Even though oil, gas, and hydroelectric power is available in the basin, developmental and environmental problems make it doubtful that these resources will be a major source of energy for the next several years. The federal government, nevertheless, is moving quickly to facilitate the development of the region's energy resources at acceptable economic and environmental costs, regardless of the difficulty of the decisions that must be made. Water, costs, and socioeconomic problems of the basin's development form the basis of this discussion.

ABSTRACT

Accession Number:
@ 214
Carter, J.R., and Green, A.R., 1963, Floods in Wyoming, magnitude and frequency: U.S. Geological Survey Circular 478, 27 p.

Contact: Public Inquiries Office (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY, FLOODS

Access Code: 152 Use Code: 02

Methods are described in the report for estimating the magnitude of a flood of any frequency between 1.1 and 50 years for any site, gaged or ungaged, on most unregulated streams in Wyoming, within the limits of basin size for which records have been collected. Flood-frequency relations are not defined for a large part of the headwaters of the North Platte River in south-central Wyoming because of the paucity of streamflow data.

Relations of the mean annual flood as the dependent variable to certain basin characteristics as independent variables are defined. Wyoming is in the headwaters of four main river basins; the independent variables used in each basin are as follows:

Missouri River basin: only drainage area for part of the basin; drainage area and mean basin altitude for part of the basin.

Green River basin: drainage area and altitude at site; separate drainage area relation curve for main stem of Green River.

Bear River basin: drainage area and mean basin altitude.

Snake River basin: drainage area, mean annual precipitation, and a geographic factor.

Curves are presented showing the ratio of floods of selected frequencies to the mean annual flood used as an index. A separate ratio curve is shown for the main stem of Green River. The ratio to mean annual flood varies with mean basin altitude for a small part of Snake River basin along with the west-central border of the state.

Data are tabulated for the maximum known flood at each gaging station for which records are used in the analysis.

ABSTRACT

Accession Number:
@ 215
C-b Shale Oil Project (Cathedral Bluffs Shale Oil Co., Tenneco Shale Oil Co. and Occidental Oil Shale, Inc.,) April 1981, 1980 C-b annual report, v. 1- summary of development activities, costs, and environmental monitoring: U.S. Dept. of Interior, prototype oil shale leasing program, 165 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, PROCESS WATER USE, SPRINGS, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, ENVIRONMENTAL, CLIMATE

Access Code: 011 Use Code: 02

This is Volume 1 of the 1980 annual report for the Development Monitoring Program at tract C-b. This report summarizes the development activities, costs, environmental monitoring and other programs on this tract during calendar year 1980. The principle activity during this period consisted of the sinking of three shafts with construction of attendant support facilities to dispose of the mine water and to store mined rock.

This report includes sections on: development activities; processing; disturbed and reclaimed areas; environmental protection and control (air pollution control, water management, water augmentation, oil and hazardous materials spill contingency, waste disposal, erosion control, fish and wildlife protection, and others); socio-economic activities; and environmental monitoring.

ABSTRACT

Accession Number:
@ 216
C-b Shale Oil Project (Cathedral Bluffs Shale Oil Co., Tenneco Shale Oil Co. and Occidential Oil Shale, Inc.), April 1981, 1980 C-b annual report, v. 2 - environmental analysis: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SPRINGS, SUBSIDENCE, CLIMATE, ENVIRONMENTAL

Access Code: 011 Use Code: 01

This is Volume 2 of the 1980 annual report for the Development Monitoring Program at tract C-b. This report presents the results of analyses to identify the impact of tract development on the local environment, and it focuses on key indicators of environmental quality and/or change. Since development activities were not started until 1978, these data and analyses may be considered as a continuation of the environmental baseline and background definition. This report includes separate, interpretative sections on: tract photography, hydrology and water quality, air quality and meteorology noise, biology, aesthetics, industrial health, safety and security, subsidence monitoring, and ecosystem interrelationships.

ABSTRACT

Accession Number:
@ 217
C-b Shale Oil Project (Cathedral Bluffs Shale Oil Co., Tenneco Shale Oil Co. and Occidental Oil Shale, Inc.), April 1981, 1980 C-b annual report, v 2A - Vol. 2, supporting data: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SPRINGS, CLIMATE

Access Code: 011 Use Code: 01

This is Volume 2A of the 1980 annual report for the Development Monitoring Program at tract C-b. This appendix contains the supporting data for Volume 2, Environmental Analysis (Abstract No. 216). These data appear in the form of supporting analyses, figures, and tables. Separate sections are included on tract photography, hydrology and water quality, air quality and meteorology, and biology. The hydrology and water quality section includes procedures and results of a Box-Jenkins univariate time-series analysis for spring and seep flows, water level time plots, tabular summaries of surface and ground water quality data and time plots of spring and well water quality data. The meteorology section presents tabular monthly summaries of precipitation and barometric pressure and time plots of temperature.

ABSTRACT

Accession Number:
@ 218
C-b Shale Oil Project (Cathedral Bluffs Shale Oil Company, Tenneco Shale Oil Co., Occidental Oil Shale, Inc.), April 1980, 1979 C-b annual report, v. 1 - summary of development activities, costs and environmental monitoring: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, PROCESS WATER USE, SPRINGS, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, ENVIRONMENTAL, CLIMATE

Access Code: 132 Use Code: 02

This is Volume 1 of the 1979 annual report for the Development Monitoring Program at tract C-b. This report summarizes the development activities, costs, and environmental monitoring and other programs on this tract during calendar year 1979. The principle activity during this period consisted of the sinking of three shafts with construction of attendant support facilities to dispose of mine water and store mined rock.

This report includes sections on: development activities; processing; disturbed and reclaimed areas; environmental protection and control (air pollution control, water management, water augmentation, oil and hazardous materials spill contingency, waste disposal, erosion control, fish and wildlife protection, and others); socio-economic activities; and environmental monitoring.

ABSTRACT

Accession Number:
@ 219
C-b Shale Oil Project (Cathedral Bluffs Shale Oil Company, Tenneco
Shale Oil Co. and Occidental Oil Shale, Inc.), April 1980, 1979
C-b annual report, v. 2 - environmental analysis: U.S. Dept. of
Interior, prototype oil shale leasing program, 290 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE, ENVIRONMENTAL

Access Code: 011 Use Code: 02

This is Volume 2 of the 1979 annual report for the Development Monitoring Program at tract C-b. This report presents the results of analyses to identify the impact of tract development on the local environment, and it focuses on key indicators of environmental quality and/or change. Since development activities were not started until 1978, these data and analyses may be considered as a continuation of the environmental baseline and background definition. This report includes separate, interpretative sections on: tract photography, indicator variables, hydrology, aquatic ecology, air quality, meteorology, noise, wildlife biology, vegetation, ecosystem interrelationships, health and safety, and toxicology. A fold out map shows the locations of monitoring stations.

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ABSTRACT

Corp. authors

Accession Number:
@ 220
C-b Shale Oil Project (Cathedral Bluffs Shale Oil Company, Tenneco Shale Oil Co., Occidental Oil Shale, Inc.), April 1980, 1979 C-b annual report, v. 2A - Vol. 2, supporting data: U.S. Dept. of Interior, prototype oil shale leasing program. Bureau of LAND. management

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

II ~~Key Categories~~: COLORADO, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE

? Access Code: 132 cc Use Code: 02

1st

This is Volume 2A of the 1979 annual report for the Development Monitoring Program at tract C-b. This appendix contains the supporting data for Volume 2, Environmental Analysis (Abstract No. 219). These data appear in the form of supporting analyses, figures, and tables. Separate sections are included on tract photography, groundwater and surface water hydrology and quality, meteorology, and biology. The hydrology and water quality section presents data on levels, flows and water quality of streams, alluvial and aquifer wells. Based on level and flow data, corrections are suggested under the water augmentation plan for tract C-b. Procedures and results of a Box-Jenkins univariate time series analysis are given. The meteorology section includes summaries of climatological records for the year.

Agency U.S. Geological Survey

15th - 1st

ABSTRACT

Accession Number:
@ 221
C-b Shale Oil Project (Ashland Oil and Occidental Oil Shale, Inc.),
April 1979, 1978 C-b annual report, v. 1 - summary of development
activities, costs, and environmental monitoring: U.S. Dept. of
Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, ENVIRONMENTAL, CLIMATE

Access Code: 132 Use Code: 03

This is Volume 1 of the 1978 annual report for the Development Monitoring Program at tract C-b. This report summarizes the development activities, costs, and environmental monitoring and other programs on this tract during calendar year 1978.

This report includes sections on: development activities; processing; overburden and shale handling; construction activities for access and service; environmental protection; socio-economic activities; site photography; and a summary of environmental monitoring.

ABSTRACT

Accession Number:
@ 222
C-b Shale Oil Project (Ashland Oil and Occidental Oil Shale, Inc.), April 1979, 1978 C-b Annual Report, v. 2 - environmental analysis: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE, ENVIRONMENTAL

Access Code: 132 Use Code: 02

This is Volume 2 of the 1978 annual report for the Development Monitoring Program at tract C-b. This report presents the results of analyses to identify the impact of tract development on the local environment, and it focuses on key indicators of environmental quality and/or change. Since development activities were not started until 1978, much of the data and analyses in this report may be considered as a continuation of the environmental baseline and background definition. This report includes separate, interpretative sections on: tract photography, hydrology and water quality, air quality and meteorology, noise, biology, aesthetics, industrial health, safety and security, and ecosystem interrelationships.

pril Transmission

ABSTRACT

Accession Number:
@ 223
C-b Shale Oil Project (Ashland Oil and Occidental Oil Shale, Inc.),
April 1979, 1978 C-b Annual Report, v. 2A - Vol. 2, supporting
data: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE

Access Code: 132 Use Code: 02

This is Volume 2A of the 1978 annual report for the Development Monitoring Program at tract C-b. This appendix contains the supporting data for Volume 2, Environmental Analysis (Abstract No. 222). These data appear in the form of supporting analyses, figures, and tables.

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ABSTRACT

Accession Number:
@ 223.1
C-b Shale Oil Project, Feb. 1979, Application for a permit to inject water produced from oil shale tract C-b: report submitted to Colorado Dept. of Health.

Contact: Bob Thomason (copy)

Key Categories: COLORADO, GROUNDWATER QUANTITY, ENVIRONMENTAL, IN-SITU

Access Code: 011 Use Code: 02

This report describes a system to reinject mine water at tract C-b for an in situ development scenario. The report describes the tract and the area within a two-mile radius. All oil, gas, water, and oil shale coreholes in this area are tabulated. A topographical, cultural, and environmental assessment of the tract C-b area is presented. The geology and mineral resources of the Piceance basin is overviewed, and detailed geologic information on tract C-b is presented. Surface and subsurface water resources are described. Water quality analyses and water level measurements made on Tract C-b from 1974 are presented and discussed. Detailed results of laboratory experiments to determine the effects of mining on water chemistry, plans and specifications for the injection system, and results of modelling of the dewatering-injection system also are presented.

ABSTRACT

Accession Number:
@ 224
C-b Shale Oil Project, (Occidental Oil Shale, Inc.), 1979, Development monitoring program for oil shale tract C-b: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE

Access Code: 132 Use Code: 02

This report outlines the monitoring program for tract C-b to be employed during tract development. The objectives of the program are to provide a record of changes from conditions existing prior to development, a continuing check on compliance with the Lease and Stipulations, timely notice of detrimental effects and conditions requiring correction; and a factual basis for revision or amendment of the Lease. The annual reports submitted under this program are abstracted elsewhere (Abstract Nos. 216, 219, 222).

ABSTRACT

Accession Number:
@ 225
C-b Shale Oil Project (Ashland Oil and Occidental Oil Shale, Inc.), May 1978, Tract C-b interim monitoring report #2, v. 1 and 2: U.S. Dept. of Interior, prototype oil shale leasing program

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, CLIMATE

Acccess Code: 002 Use Code: 02

The federal lease on tract C-b was suspended from November 1, 1976 through August 31, 1977. Monitoring conducted during this period was carried out under a program known as the Interim Monitoring Phase and reported in Interim Monitoring Report #1 (Abstract No. 228.1). This Interim Monitoring Period was later extended to cover the period from September 1, 1977 through March 31, 1978. This two-volume report summarizes the monitoring carried out during this period.

ABSTRACT

Accession Number:
@ 226
C-b Shale Oil Project, (Ashland Oil, Inc. and Occidental Oil Shale, Inc.), 1977, Environmental baseline program Nov. 1974 - Oct. 1976, final report, executive summary: U.S. Dept. of Interior, prototype oil shale leasing program, 57 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This is the Executive Summary of the Final Report for the Environmental Baseline Program at tract C-b. The data collected under this program is summarized in eight quarterly summary reports abstracted elsewhere. The detailed final report is presented in five volumes as follows: Volume I, Regional and Temporal Setting; Volume II, Hydrology; Volume III, Meteorology, Air Quality, and Noise; Volume IV, Ecology; and Volume V, System Interrelationships. The hydrology (Abstract No. 227) and meteorology (Abstract No. 228) volumes are abstracted elsewhere in this bibliography. This summary presents a broad overview of the information presented in Volumes I-V.

ABSTRACT

Accession Number:
@ 227
C-b Shale Oil Project, (Ashland Oil, Inc. and Occidental Oil Shale, Inc.), 1977, Environmental baseline program Nov. 1974 - Oct. 1976, final report, v. 2 - hydrology: U.S. Dept. of Interior, prototype oil shale leasing program, 329 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE, SEDIMENT

Access Code: 011 Use Code: 01

This is Volume II of the Final Report for the Environmental Baseline Program at tract C-b. It summarizes and interprets hydrologic data collected from November 1974 through October 1976. The report is divided into two principle sections which present a wealth of data, tabular summaries and time plots on surface water and groundwater quality and quantity in the vicinity of tract C-b.

The surface water section presents the results of measurements made at 13 stream gauging stations. It includes a number of stream hydrographs; monthly irrigation diversions in the vicinity of tract C-b; peak flow return periods; sediment particle size distributions and sediment chemical composition; flow and quality data for springs; chemical analyses of precipitation; correlations of quality data with flow, mean monthly plots of several water quality parameters; and water quality summaries which include ranges, means and standard deviations for each operation.

The groundwater section summarizes the results of aquifer tests to determine storage coefficients and hydraulic transmissivities; it presents well level measurements for alluvial and deep aquifer wells; it presents potentiometric surface maps for the tract and the Piceance Basin; and it summarizes the results of major and trace constitutent analysis for several alluvial and deep wells.

ABSTRACT

Accession Number:
@ 228
C-b Shale Oil Project, (Ashland Oil, Inc. and Occidental Oil Shale, Inc.), 1977, Environmental baseline program Nov. 1974 - Oct. 1976, final report, v. 3 - meteorology, air quality, and noise: U.S. Dept. of Interior, prototype oil shale leasing program, 508 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE

Access Code: 132 Use Code: 01

This is Volume III of the Final Report for the Environmental Baseline Program at tract C-b. It summarizes and interprets meteorology, air quality, and noise data collected from November 1974 through October 1976.

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no 229

ABSTRACT

Accession Number:
@ 228.1
C-b Shale Oil Project (Ashland Oil and Occidental Oil Shale, Inc.), Oct. 1977, Tract C-b interim monitoring report #1, v. 1 and 3: U.S. Dept. of Interior, prototype oil shale leasing program

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, SPRINGS, CLIMATE, ENVIRONMENTAL

Acccess Code: 002 Use Code: 02

The federal lease on tract C-b was suspended from November 1, 1976, through August 31, 1977. The environmental monitoring conducted during this period was carried out under a program known as the "Interim Monitoring Phase." This three volume report summarizes the monitoring carried out from November 1976 through August 1977. Volume 1 presents pre-exploration environmental reconnaissance surveys and environmental baseline monitoring programs for hydrology, water quality and air quality. Volume 2 presents references and Volume 3 summarizes the results of biological, revegetation and microenvironmental studies.

ABSTRACT

Accession Number:
@ 230
C-b Shale Oil Project (Ashland Oil and Occidental Oil Shale), Feb. 1977, Oil shale tract C-b, modifications to detailed development plan: Report submitted to area oil shale supervisor.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: PROCESS WATER USE, IN-SITU, EFFLUENTS

Access Code: 011　　Use Code: 02

This volume modifies the original Detailed Development Plan (DDP) for tract C-b described in Abstract Numbers 231 and 232. The original development plan called for TOSCO II surface retorting with underground mining. This modification changes these plans to modified in situ retorting using the Occidental process. This report outlines changes in the proposed development of tract C-b and thus, frequent reference is made to the original plan.

ABSTRACT

Accession Number:
@ 231
C-b Shale Oil Project (Ashland Oil and Shell Oil Company), Feb. 1976, Detailed development plan and related materials, v. I - introduction, detailed development plan, environmental control plan, environmental monitoring program: Report submitted to the area oil shale supervisor.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE, EFFLUENTS

Access Code: 011 Use Code: 02

This is Volume I of the original Detailed Development Plan for lease tract C-b submitted under the Federal Prototype Oil Shale Leasing Program. This volume describes the technical aspects of a 45,000 barrel per day surface retorting facility based on six individual TOSCO II retorting trains, each capable of processing 11,000 tons per day of raw shale. The scenario includes on-site upgrading and byproducts including 4,200 barrels of liquified petroleum gas, 180 tons of sulfur, 140 tons of ammonia and 800 tons of coke. Mining is by conventional underground room-and-pillar at an annual rate of 21.7 million tons.

This volume describes and discusses mine development, plant construction, plant operation, and post operations. A section outlining environmental control plans is also included discussing air, water, and noise pollution control, fire prevention and control, health and safety, and others.

ABSTRACT

Accession Number:
@ 232
C-b Shale Oil Project (Ashland Oil and Shell Oil Company), Feb. 1976,
Oil shale tract C-b, detailed development plan and related materials, v. II - summary of first year, environmental baseline and programs and environmental testing: Report sumittted to the area oil shale supervisor.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, ENVIRONMENTAL, SPRINGS, CLIMATE, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

This is Volume II of the original detailed development plan for lease tract C-b. This volume summarizes the first year's environmental baseline programs and the environmental setting. The surface retorting project with underground mining proposed for this tract is described in Volume I.

Extensive baseline studies at tract C-b, covering surface water, flora, fauna, aquatic ecology, soil productivity, air quality, soils and geology, and groundwater, were started in 1974. The detailed data from these studies are presented in quarterly data reports included elsewhere in this bibliography (Abstract Nos. 238-241). This report reviews and interprets the data collected during the first year of these studies, April 1974 through October 1975. Data and interpretative sections are included on the following topics: geology and resources; hydrology and water quality; climate and air quality; biotic communities; soil survey and productivity assessment; scenic and archaeological values; and environmental setting of off-tract corridors.

ABSTRACT

Accession Number:
@ 233
C-b Shale Oil Project (Ashland Oil and Occidental Oil Shale, Inc.),
Supplemental materials to detailed development plans.

Contact: Area Oil Shale Supervisor's Office (loan)

Key Categories: PROCESS WATER USE, EFFLUENTS, IN-SITU

Access Code: 002 Use Code: 02

The suplemental material to the Detailed Development Plan Modifications includes: manpower skill breakdown, mining plan for ancillary development, ancillary product marketing and environmental control plan.

ABSTRACT

Accession Number:
@ 234
C-b Shale Oil Project (Ashland Oil and Shell Oil Co.), 1976, First year environmental baseline program: annual summary and trends report, Nov. 1974 - Oct. 1975, U.S. Dept. of Interior, prototype oil shale leasing program, 546 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE

Access Code: 132 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality and quantity, and air quality. These data were filed on a quarterly basis with the U.S. Geological Survey's Area Oil Shale Supervisor in Grand Junction, Colorado. Summary reports were prepared describing the type of data filed in these Quarterly Reports. These are abstracted elsewhere (Abstract Nos. 238-241).

This report reviews and interprets the data collected during the first year of these studies, April 1974 through October 1975. Data and interpretative sections are included on the following topics: geology and resources; hydrology and water quality; climate and air quality; biotic communities; soil survey and productivity assessment; scenic and archaeological values; and environmental setting of off-tract corridors. This information also is summarized in C-b Shale Oil Project, Feb. 1976 (Abstract No. 232).

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ABSTRACT

Accession Number:
@ 234.1
C-b Shale Oil Project (Ashland Oil, Inc. and Shell Oil Co.), 1976, Oil Shale tract C-b environmental and exploration program summary report no. 8 through August 31, 1976: U.S. Dept. of the Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE

Access Code: 002 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. The studies include plant, animal, and aquatic ecology, water quality, hydrology, and air quality. These data were filed on a quarterly basis with the U.S.G.S.'s Area Oil Shale Supervisor in Grand Junction, Colorado. Summary reports were prepared describing the type of data filed in the Quarterly Reports and presenting interpretations, as appropriate.

This is the eighth summary report for tract C-b filed under the baseline program, and its overviews four volumes of data filed as Quarterly Report #8. The full report is an assemblage of environmental and exploration data that covers the summer quarter of June 1976 through August 1976. This report presents and interprets data on the following topics: stream and spring quality and quantity; groundwater quality and quantity; climate and air quality; terrestrial and aquatic biota; soils; geology; and ecological interrelationships.

ABSTRACT

Accession Number:
@ 235
C-b Shale Oil Project (Ashland Oil, Inc. and Shell Oil Co.), 1976,
Oil shale tract C-b environmental and exploration program summary
report No. 7 through May 31, 1976: report submitted under
prototype oil shale leasing program, 105 p.

Contact: Area Oil Shale Supervisor's Office (loan)
E, ENVIRONMENTALnvironmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE, WATER QUALITY, SURFACE, WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE, ENVIRONMENTAL

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. These data were filed on a quarterly basis with the U.S. Geological Survey's Area Oil Shale Supervisor in Grand Junction, Colorado. Summary reports were prepared describing the type of data filed in these Quarterly Reports and presenting interpretations, as appropriate.

This is the seventh summary report for tract C-b filed under the baseline program, and it overviews three volumes of data filed as Quarterly Report #7. The full Quarterly Report is an assemblage of environmental and exploration data that covers the Spring quarter of 1976. This report presents and interprets data on the following topics: stream and spring quality and quantity; groundwater quality and quantity; climate and air quality; terrestrial and aquatic biota; soils; geology; and ecological interrelationships.

ABSTRACT

Accession Number:
@ 236
C-b Shale Oil Project (Ashland Oil, Inc. and Shell Oil Co.), 1976,
Oil shale tract C-b environmental and exploration program summary
report No. 6 through Feb. 29, 1976: report submitted under
prototype oil shale leasing program, 134 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE, ENVIRONMENTAL

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. These data were filed on a quarterly basis with the U.S. Geological Survey's Area Oil Shale Supervisor in Grand Junction, Colorado. Summary reports were prepared describing the type of data filed in these Quarterly Reports and presenting interpretations, as appropriate.

This is the sixth summary report for tract C-b filed under the baseline program, and it overviews three volumes of data filed as Quarterly Report #6. The full Quarterly Report is an assemblage of environmental and exploration data that covers the Winter quarter of December 1975 through February 1976. This report presents and interprets data on the following topics: stream and spring quality and quantity; groundwater quality and quantity; climate and air quality; terrestrial and aquatic biota; soils; geology; and ecological interrelationships.

ABSTRACT

Accession Number:
@ 237
C-b Shale Oil Project (Ashland Oil, Inc. and Shell Oil Co.), 1976, Oil shale tract C-b environmental and exploration program summary report No. 5 through Nov. 30, 1975: report submitted under prototype oil shale leasing program, 116 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE, ENVIRONMENTAL

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. These data were filed on a quarterly basis with the U.S. Geological Survey's Area Oil Shale Supervisor in Grand Junction, Colorado. Summary reports were prepared describing the type of data filed in these Quarterly Reports and presenting interpretations, as appropriate.

This is the fifth summary report for tract C-b filed under the baseline program, and it overviews five volumes of data filed as Quarterly Report #5. The full Quarterly Report is an assemblage of environmental and exploration data that covers the Fall quarter of September 1975 through November 1975. This report presents and interprets data on the following topics: stream and spring quality and quantity; groundwater quality and quantity; climate and air quality; terrestrial wildlife; aquatic organisms; terrestrial vegetation; dendrochronology and dendroclimatology; soils; and geology.

ABSTRACT

Accession Number:
@ 238
C-b Shale Oil Project (Ashland Oil, Inc., Atlantic Richfield Co., Shell Oil Co., and The Oil Shale Corp.), Aug. 1975, Oil shale tract C-b environmental and exploration program summary report No. 4 through Aug. 31, 1975: report submitted under prototype oil shale leasing program, 200 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE, ENVIRONMENTAL

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. These data were filed on a quarterly basis with the U.S. Geological Survey's Area Oil Shale Supervisor in Grand Junction, Colorado. Summary reports were prepared describing the type of data filed in these Quarterly Reports and presenting interpretations, as appropriate.

This is the fourth summary report for tract C-b filed under the baseline program, and it overviews four volumes of data filed as Quarterly Report #4. The full Quarterly Report is an assemblage of environmental and exploration data that covers the Summer quarter of June 1975 through August 1975. This report presents and interprets data on the following topics: stream and spring quality and quantity; groundwater quality and quantity; climate and air quality; terrestrial wildlife; aquatic organisms; terrestrial vegetation; dendrochronology and dendroclimatology; and soils.

ABSTRACT

Accession Number:
@ 239
C-b Shale Oil Project, July 1975, Oil shale tract C-b environmental and exploration program summary report No. 3 through May 31, 1975: Ashland Oil, Inc., Atlantic Richfield Co., Shell Oil Co., and The Oil Shale Corp.: report submitted under prototype oil shale leasing program, 164 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE, ENVIRONMENTAL

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. These data were filed on a quarterly basis with the U.S. Geological Survey's Area Oil Shale Supervisor in Grand Junction, Colorado. Summary reports were prepared describing the type of data filed in these Quarterly Reports and presenting interpretations, as appropriate.

This is the third summary report for tract C-b filed under the baseline program, and it overviews 18 volumes of data filed as Quarterly Report #3. The full Quarterly Report is an assemblage of environmental and exploration data that covers the Spring Quarter of March 1975 through May 1975. This report includes sections on surface water (streams and springs); core drilling and associated groundwater; air quality; biology, and other studies.

ABSTRACT

Accession Number:
@ 240
C-b Shale Oil Project (Ashland Oil, Inc., Atlantic Richield Co., Shell Oil Co., and The Oil Shale Corp.), April 1975, Oil shale tract C-b environmental and exploration program summary report No. 2 through Feb. 28, 1975: report submitted under prototype oil shale leasing program, 133 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE, ENVIRONMENTAL

Access Code: 011 Use Code: 03

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. These data were filed on a quarterly basis with the U.S. Geological Survey's Area Oil Shale Supervisor in Grand Junction, Colorado. Summary reports were prepared describing the type of data filed in these Quarterly Reports and presenting interpretations, as appropriate.

This is the second summary report for tract C-b filed under this baseline program and overviews 13 volumes of data filed as Quarterly Report #2. The full Quarterly Report is an assemblage of environmental and exploration data received during the Winter Quarter of December 1974 through February 1975. This report includes sections on surface water (streams and springs); core drilling and associated groundwater; air quality; biology; and other studies. Preliminary data are presented and discussed, and conclusions are drawn.

ABSTRACT

Accession Number:
@ 241
C-b Shale Oil Project (Ashland Oil, Inc., Atlantic Richfield Co., Shell Oil Co., and The Oil Shale Corp.), Feb. 1975, Oil shale tract C-b environmental and exploration program summary report No. 1 through Nov. 30, 1974: report submitted under prototype oil shale leasing program, 88 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE, ENVIRONMENTAL

Access Code: 011 Use Code: 03

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. These data were filed on a quarterly basis with the U.S. Geological Survey's Area Oil Shale Supervisor in Grand Junction, Colorado. Summary reports were prepared describing the type of data filed in these Quarterly Reports and presenting interpretations, as appropriate.

This is the first summary report for tract C-b filed under this baseline program and summarizes six volumes of data (Quarterly Report #1). The report includes sections on surface water (streams and springs); core drilling and associated groundwater; air quality; biology; and other studies (revegetation, fish and wildlife, etc.). This report describes the field program, types of data to be collected, and collection methods.

CDM

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ABSTRACT

Accession Number:
@ 241.09
CDM Environmental Sciences Division, 1978, First Annual Report on the Superior Oil Company baseline meteorological monitoring program: Report submitted to Superior Oil Company.

Contact: Jim Western (access)

Key Categories: COLORADO, CLIMATE

Access Code: 002 Use Code: 02

This report summarizes the results of the first year of meteorological monitoring at Superior Oil Company's development site in the Piceance Basin.

ABSTRACT

Accession Number:
@ 241.1
Chadwick, D.G., Feb. 1972, Precipitation telemetry in mountainous areas: Water Resources Research, v. 8, no. 1, p. 255-258.

Contact: Denver Public Library (loan)

Key Categories: UTAH, CLIMATE

Access Code: 002 Use Code: 03

A battery-operated telemetry system having high resolution and accuracy was developed at the Utah Water Research Laboratory. The system is used for telemetering precipitation data from 45 remote mountain sites in the Wasatch and Uinta Mountain ranges. At selected sites temperature, wind, and the water content of snow are also telemetered. The use of a unique pick-off sensor on the transducer also permits the system to be readily adapted to telemeter information from many recording-type instruments such as a barograph.

ABSTRACT

Accession Number:
@ 242
Changery, M.J., Hodge, W.T., and Ramsdell, J.V., Sept. 1977,
Index-summarized wind data: Battelle Pacific Northwest
Laboratories, Rep. BNWL-2220 WIND-11, 152 p.

Contact: National Climatic Center (copy)

Key Categories: COLORADO, WYOMING, UTAH, CLIMATE

Access Code: 011 Use Code: 01

This index is intended to be a guide to available summaries. It does not present the actual summaries or original wind data, but lists the locations and periods for which summaries in formats described beginning on page I-13 can be obtained from the National Climatic Center for the cost of reproduction. Additional sources of wind data, presenting only monthly mean speed, are available but not listed in this document. The majority of summaries present the frequency or percentage of observations of the wind speed in various speed classes (1-3 mph, 4-7 mph, etc.) for each of 8, 16, or 36 compass points. Data for a given number of years are presented on a monthly and/or seasonal and/or annual basis. In addition, the mean speed for each direction and for all directions is usually given. A few of the summary types were developed for wind data only. In most summaries, however, wind is only one of a number of elements available. For this index, only the wind portion is presented. Since various agencies in the past have been involved in the production of these summaries, the speed class intervals have varied and data may be in knots rather than miles per hour. Summary types generally prepared from digitized data are indicated beginning on page I-15. Information on locations without summaries but with digitized records can be obtained from the Center.

The index consists of two parts. Part 1 is a geographical list presenting all summaries for a given location. It is alphabetically in state-city order. Within a city name it is ordered by station number and within station number by the earliest month-year of the period of record. Part 2 presents the data first by summary type and within summary type in state, city, station number, and period of record order.

Copies of summaries listed can be obtained for the cost of reproduction by contacting the Director, National Climatic Center, Federal Building, Asheville, NC 28801.

ABSTRACT

Accession Number:
@ 243
Chappell, W.R., and others, 1981, Trace elements in oil shale: progress report 1980 - 1981: University of Colorado Rep. COO-10298-2, 324 p.

Contact: Bill Chappell (copy)

Key Categories: LEACHING, SURFACE EFFLUENTS, RECLAMATION

Access Code: 011 Use Code: 01

This report summarizes the results of a research program to evaluate the environmental and health consequences of the release of toxic trace elements by shale oil production and use. The work has focused on the elements As, B, F, Mo, and Se.

This report consists of a series of technical progress reports on the following topics: (1) microbial thiosulfate oxidation and its effect on water quality; (2) nutrient effects on microbial mobilization of As from spent shale; (3) absorption of Hg by soils; (4) concentration of chemical elements in plants growing in spent shale; (5) effect of B on plants growing in spent shale; (6) mathematical modeling and transport mechanisms for leaching of spent shale; (7) release, transport, and fate from spent shale pollutants; (8) trace elements and organic ligands in oil shale wastes; and (9) chemical analysis of inputs and outputs of oil shale retorts.

ABSTRACT

Accession Number:
@ 244
Chappell, W.R., and others, 1980, Trace elements in oil shale: progress report 1979 -1980: University of Colorado Rep. COO-10298-1, 362 p.

Contact: Bill Chappell (copy)

Key Categories: SURFACE, EFFLUENTS, LEACHING

Access Code: 011 Use Code: 01

The purpose of this research program is to understand the potential impact of an oil shale industry on environmental levels of trace contaminants in the region. The program involves a comprehensive study of the sources, release mechanisms, transport, fate, and effects of toxic trace chemicals, principally the trace elements in an oil shale industry. The overall objective of the program is to evaluate the environmental and health consequences of the release of toxic trace elements by shale and oil production and use. The baseline geochemical survey shows that stable trace elements maps can be constructed for numerous elements and that the trends observed are related to geologic and climatic factors. Shale retorted by above-ground processes tend to be very homogeneous (both in space and in time) in trace element content. Leachate studies show that significant amounts of B, F, and Mo are released from retorted shales and while B and Mo are rapidly flushed out, F is not. On the other hand, As, Se, and most other trace elements are not present in significant quantities. Significant amounts of F and B are also found in leachates of raw shales. Very large concentrations of reduced sulfur species are found in leachates of processed shale. Very high levels of B and Mo are taken up in some plants growing on processed shale with and without soil cover. There is a tendency for some trace elements to associate with specific organic fractions, indicating that organic chelation or complexation may play an important role. Many of the so-called standard methods for analyzing trace elements in oil shale-related materials are inadequate. A sampling manual is being written for the environmental scientist and practicing engineer. A new combination of methods in developed for separating the minerals in oil shale into different density fractions. Microbial investigations have tentatively identified the existence of thiobacilli in oil shale materials such as leachates.

ABSTRACT

Accession Number:
@ 245
Chappell, W.R., and others, 1979, Trace elements in oil shale:
progress report, June 1, 1976 - Jan. 31, 1979: University of
Colorado Rep. COO-4017-3, 331 p.

Contact: Bill Chappell (copy)

Key Categories: SURFACE, EFFLUENTS, LEACHING

Access Code: 011 Use Code: 02

The overall objective of the program is to evaluate the environmental and health consequences of the release of toxic trace elements (As, B, F, Mo, Se) by shale oil production and use. Some of the particularly significant results are: The baseline geochemical survey shows that stable trace elements maps can be constructed for numerous elements and that the trends observed are related to geologic and climatic factors. Shale retorted by above-ground processes tends to be very homogeneous (both in space and in time) in trace element content. This implies that the number of analytical determinations required of processed shales is not large. Leachate studies show that significant amounts of B, F, and Mo are released from retorted shales and while B and Mo are rapidly flushed out, F is not. On the other hand, As, Se, and most other trace elements are not present in significant quantities. Significant amounts of F and B are also found in leachates of raw shales. Very large concentrations of reduced sulfur species are found in leachates of processed shale. Upon oxidation a drastic lowering in pH is observed. Preliminary data indicates that this oxidation is catalyzed by bacteria. Very high levels of B and Mo are taken up in some plants growing on processed shale with and without soil cover. These amounts depend upon the process and various site specific characteristics. In general, the amounts taken up decrease with increasing soil cover. On the other hand, we have not observed significant uptake of As, Se, and F into plants. There is a tendency for some trace elements to associate with specific organic fractions, indicating that organic chelation or complexation may play an important role. In particular, most of the Cd, Se, and Cr in shale oil is associated with the organic fraction containing most of the nitrogen-containing compounds.

ABSTRACT

Accession Number:
@ 246
Chappell, W.R., and others, 1978, Trace elements in oil shale: progress report June 1, 1977 - May 31, 1978: University of Colorado Rep. COO-4017-2, 137 p.

Contact: Bill Chappell (copy)

Key Categories: SURFACE, EFFLUENTS, LEACHING, RECLAMATION

Access Code: 011 Use Code: 03

This report summarizes progress during the second year on a research program to evaluate the environmental and health consequences of the release of toxic trace elements by shale oil production and use. The work has focused on the elements As, B, F, Mo, and Se.

This report consists of a series of technical progress reports on the following topics: (1) geochemical baseline studies; (2) chemical analysis of inputs and outputs of oil shale retorts; (3) release, transport, and fate of pollutants from spent shale; (4) and trace elements in plants growing in spent shale.

The baseline geochemical survey shows that regional trends do exist for several elements and these trends are due to primarily geologic and climatic factors. The laboratory study of the Fisher assay as a model retort shows that Zn and F may be released in significant amounts by volatilization. Studies of leachates for columns of processed shale in the laboratory and lysimeters in the field show that As and Se are of little concern in the aqueous effluent. The leachate studies also show that significant levels of B, F, and Mo exist in the leachates and that while B and Mo are flushed out of the processed shale rather rapidly, the concentrations of F in the leachates will remain high for long periods of time. Analysis of plants collected from revegetation sites show that very high levels of B can be taken up by plants growing on processed shale. Significant amounts of Mo are also taken up. The plant analyses also reveal that As and Se are not taken up in significant amounts and that adding As to the processed shale which is removed from the oil will not significantly increase As concentrations in plants.

ABSTRACT

Accession Number:
@ 247
Chappell, W.R., and others, Feb. 1977, Trace elements in oil shale: progress report June 1, 1976 - May 31, 1977: University of Colorado Rep. COO-4017-1, 91 p.

Contact: Bill Chappell (copy)

Key Categories: SURFACE, EFFLUENTS, LEACHING, RECLAMATION

Access Code: 011 Use Code: 03

This report summarizes progress during the first year on a research program to evaluate the environmental and health consequences of the release of toxic trace elements by shale oil production and use. The work has focused on the elements As, B, F, Mo, and Se.

This report consists of a series of technical progress reports on the following topics: (1) geochemical baseline studies; (2) mass balance studies on oil shale retorts; (3) release, transport, and fate of pollutants from spent shale; and (4) availability of As, Se, B, Mo, and F to plants growing on revegetated spent shales.

Preliminary results of these studies indicate that Cu, Li, and Zn exhibit well-defined trends in soils over the Piceance Basin, with values increasing from north to south. Arsenic, Mo, B, and Se are all elevated in the soils of the Piceance Basin. Molybdenum and B are more soluble in TOSCO spent shale than in unprocessed shale and are also elevated in plants growing on spent shale. Flourine is less soluble in TOSCO spent shale than in unprocessed oil shale, but nevertheless, the levels in leachates are quite significant (25 mg/l). Moreover, the F is not readily leached out. Results to date show that As and Se are not very soluble in TOSCO spent shale and are not taken up to a significant extent by plants.

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ABSTRACT

Accession Number:
@ 247.1
Cheney, W., 1976, Colorado River storage project model: in Clyde, C.G., Falkenborg, D.H., and Riley, J.P., eds., Colorado River basin modeling studies, Utah Water Research Laboratory, p. 169.

Contact: Utah Water Research Laboratory (copy)

Kay Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 02

This paper very briefly overviews the U.S. Bureau of Reclamation's Colorado River Storage Project Model. This model has been updated. The model reviewed in the present paper was capable of computing water flow, salinity, and power at various points in the Colorado River system, and is operated on a monthly basis. The water supply was taken from the 1906-1972 period of flows modified to the 1968 level of depletion. This is an operations model developed to study the ability of the Upper Basin to meet the Lee Ferry flow commitment.

ABSTRACT

Accession Number:
@ 248
Chevron Shale Oil Company, 1981, Clear Creek shale oil project, preliminary project description: special report submitted to BLM for preparation of environmental impact statement, 66 p.

Contact: BLM - Grand Junction (copy)

Key Categories: EFFLUENTS, PROCESS WATER USE, SURFACE

Access Code: 011 Use Code: 03

This is a preliminary project descripton for the Chevron Clear Creek oil shale project. It was submitted to the BLM as first step in preparing a site-specific EIS. It presents a broad and very general description of proposed environmental studies, water supply, and sour water processing.

ABSTRACT

Accession Number:
@ 249
Chew, R.T., 3rd, 1974, Geology, hydrology and extraction operations at the Occidental Petroleum Corporation, oil shale pilot plant near De Beque, Colorado: in Murray, D.K., ed., Energy resources of the Piceance Creek Basin, Colorado, 25th Field Conference of the Rocky Mountain Association of Geologists, Denver, Colorado, p. 135-140.

Contact: USGS Library - Denver (loan)

Key Categories: GROUNDWATER QUANTITY, COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This paper presents a broad overview of the hydrology, retorting technology, and environmental effects of in-situ retorting at Occidental's Logan Wash, Colorado, experimental site. The operation discussed is at the head of Logan Wash east of the Roan Creek road near the southwest corner of the Piceance Creek Basin. The paper briefly discusses the geohydrology of the site and overview mining and retorting methods that were being investigated by Occidental (then Garrett Research and Development Co., Inc.) in 1974.

ABSTRACT

Accession Number:
@ 249.1
Chrisman, J., Jr., Snyder, J.H., and Moore, C.V., April 1976, Water problems in the Colorado River basin: legal and institutional framework: NRE Economic Research Service, U.S. Dept. of Agriculture, working paper no. 2, 70 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, WATER LAW

Access Code: 002 Use Code: 03

A comprehensive review is presented of state, interstate, and international arrangements, agreements, contracts and legal decisions that have governed or now dictate management of the waters in the Colorado River. Emphasis is placed on legal and institutional arrangements as they relate to water quality management problems. Implications of recent decisions governing construction of a desalting plant are included.

ABSTRACT

Accession Number:
@ 250
Christopulos, G.L., 1975, Wyoming water and irrigation laws: Wyoming State Engineer's Office, Cheyenne, WY, 133 p. plus index.

Contact: Wyoming State Engineer's Office (copy)

Key Categories: WYOMING, WATER LAW

Access Code: 011 Use Code: 01

This report is a compilation of Wyoming water and irrigation laws. Relevant statutes are compiled from the State constitution and State Acts. An index provides detailed references to the appropriate statutes.

ABSTRACT

Accession Number:
@ 250.1
Claassen, H.C., 1971, Radiochemical analyses of water samples from selected streams and precipitation collected Oct. 23-Nov. 9, 1970, in conjunction with the first production-test flaring of gas from test well, project Rulison: U.S. Geological Survey Rep. USGS-474-108 (AEC), 10 p.

Contact: NTIS (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 002 Use Code: 03

The U.S. Geological Survey established a water-sampling network in central and western Colorado to sample the hydrologic environment prior to, during, and following the various phases of project Rulison. This report presents data from samples collected from August 15, 1970 through October 13, 1970, monitoring the Rulison test, in the gas-production calibration and flaring phase of the project. The period of time covered by this report was one of very low tritium values in precipitation. The stream samples are a little higher in tritium, reflecting more nearly the average, long-term tritium background. Gross alpha and beta values for the dissolved constituents show little variation, as do the tritium values. There is greater variation in the gross alpha and beta values for the suspended portion of the sample.

Rulison

984

ABSTRACT

Accession Number:
@ 250.2
Claassen, H.C., 1971, Radiochemical analyses of water from selected streams and precipitation collected immediately before and after the second production-test flaring, project Rulison: U.S. Geological Survey Rep. USGS-474-122 (Rulison-10), 10 p.

Contact: NTIS (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 002 Use Code: 03

The U.S. Geological Survey established a water-sampling network in central and western Colorado to sample the hydrologic environment prior to, during, and following the various phases of project Rulison. Project Rulison is an experiment designed to stimulate production of natural gas by explosion of a nuclear device in the gas-reservoir rock. Data obtained by analysis of samples collected from the network stations are presented. All of the precipitation samples are routinely analyzed for tritium. Stream samples collected at Plateau Creek near Cameo and Colorado River near Debeque are routinely analyzed for tritium, gross alpha, and gross beta contents. Data are tabulated from samples collected in conjunction with the second production flaring (December 1 to December 20, 1970). The period of observation was one of undetectable amounts of tritium in precipitation and lower than the first production flaring values for both tritium and gross radioactivity in streams.

ABSTRACT

Accession Number:
@ 250.3
Claassen, H.C., and Voegeli, P.T., Sr., 1971, Radio chemical analyses of water samples from selected streams and precipitation collected in connection with calibration-test flaring of gas from test well, Aug. 15-Oct. 13, 1970, project Rulison: U.S. Geological Survey Rep. USGS-474-107 (AEC), 10 p.

Contact: NTIS (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 002 Use Code: 03

The U.S. Geological Survey established a water-sampling network in central and western Colorado to sample the hydrologic environment prior to, during, and following the various phases of project Rulison. This report presents data from samples collected from August 15, 1970 through October 13, 1970, monitoring the Rulison test, in the gas-production calibration and flaring phase of the project. The period of time covered by this report was one of very low tritium values in precipitation. The stream samples are a little higher in tritium, reflecting more nearly the average, long-term tritium background. Gross alpha and beta values for the dissolved constituents show little variation, as do the tritium values. There is greater variation in the gross alpha and beta values for the suspended portion of the sample.

ABSTRACT

Accession Number:
@ 250.4
Clay, H.M., and Frank, E.G., Feb. 1971, Management of water quality in releases from southwestern impoundments: Water Resources Bulletin, v. 7, no. 1, p. 137-147.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

The objective is to see whether selective withdrawal of water is possible in Southwestern reservoirs. By use of the Bohan-Grace solution, prediction of outflow water quality was within 15 percent of reservoirs as shallow as 55 feet. Increases in rate of flow increased the withdrawal layer.

ABSTRACT

Accession Number:
@ 251

Cleave, M.L., Porcella, D.B., and Adams, V.D. 1980, Potential for changing phytoplankton growth in Lake Powell due to oil shale development: in Environmental Science & Technology, v. 14, no. 6, p. 683-690.

Contact: Denver Public Library (loan)

Key Categories: UTAH, LEACHING, SURFACE, SALINITY

Access Code: 011 Use Code: 01

The potential effects of oil shale leachate (Paraho, Union) and salinity additions on the productivity of freshwater algae were studied in laboratory studies using batch bioassays. These batch bioassays were used to screen variations of water extractions of different processed and unprocessed oil shales, and the concentration effects of both the salts and the oil shale extractions on the growth of indigenous algae from Lake Powell. The batch bottle bioassays were conducted following the standard algal assay procedure as closely as possible. Variations in the standard algal assay procedure included media variation with the use of an indigenous algal genus isolated from Lake Powell. The growth of the indigenous algal genus (Scenedesmus) was stimulated by adding oil shale extract at lower concentrations. Higher concentrations of oil shale leachate inhibited the indigenous algal growth.

ABSTRACT

Accession Number:
@ 252
Cleave, M.L., Adams, V.D., and Porcella, D.B., Dec. 1979, Effects of oil shale leachate on phytoplankton productivity: Utah Water Research Laboratory, Utah State University, Water Quality Series UWRL/Q-79/05, 79 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: UTAH, LEACHING, SURFACE, SALINITY, IN-SITU

Access Code: 011 Use Code: 01

The effect of oil shale leachate and salinity additions on the productivity of freshwater algae were studied in the laboratory using batch bioassays. These batch bioassays were used to screen variations of ten salts in single and multiple additions of all possible combinations of the ten salts; water extractions of different processed and unprocessed oil shales; and the concentration effects of both the salts from 0.3 N to 0.05 N as NaCl and the oil shale extractions on the growth of standard test algae and indigenous algae from Lake Powell.

The batch bottle bioassays were conducted following the standard algal assay procedure as closely as possible. Variations in the standard algal assay procedure included media variation with the use of indigenous algal species isolated from Lake Powell and the use of three different algal species for test innoculum in the bioassay procedure. The biomass was monitored using optical density, chlorophyll a fluorescence, and/or cell counts.

The indigenous algal species were found to be negatively affected but more tolerant to all salinity additions than the standard test alga. The growth of the indigenous algal species (Scenedesmus bijuga) was also stimulated by adding oil shale extract at lower concentrations. Higher concentrations of oil shale leachate inhibited, the indigenous algal growth.

An appendix to this report tabulates the results of column leaching studies using raw and spent Paraho shale, raw and spent Union shale, and raw and spent Geokinetics shale.

ABSTRACT

Accession Number:
@ 253
Cloninger, J.S., 1978, Revegetation of retorted shale: presented at American Nuclear Society, Denver, CO, Sept. 26, 1978, Union Oil Co., Grand Junction, CO., 29 p.

Contact: Jim Cloninger (copy)

Key Categories: SURFACE, RECLAMATION

Access Code: 011 Use Code: 02

This article reviews studies on the reclamation of spent shales and describes a proposed Union spent shale disposal system. The paper summarizes physical and chemical characteristics of spent shales from TOSCO II, USBM, Paraho, and Union retorts, and it presents a summary of field revegetation studies that have been conducted in the Piceance and Uinta basins. The results of Union Oil Co. revegetation studies on spent shales from the Union A, SGR, and B retorts are described, and Union's spent shale disposal plans for the Long Ridge facility are discussed.

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ABSTRACT

Accession Number:
@ 253.1
Clyde, C.G., 1974, Energy production and water supply: in Energy, environment and water resources, Proceedings of the Unversities Council on Water Resources meeting, July 28-31, 1974, Logan, Utah, p. 319-331.

Contact: Utah State University Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 03

An overview is given of how the Colorado River basin's energy and water future fits into national patterns. Fifteen questions are directed at participants of the conference to aid them in discovering how additional energy reserves can be developed in a region where water is already totally committed, if not over-committed.

ABSTRACT

Accession Number:
@ 253.2
Clyde, C.G., and King, A.B., Oct. 1973, Optimal allocation of water resources in Utah: Journal of the Hydraulics Division, ASCE, v. 99, no. HY10, Proceedings paper no. 10088, p. 1777-1794.

Contact: Denver Public Library (loan)

Key Categories: UTAH, PRESENT WATER USE, COMPUTER MODELS

Access Code: 002 Use Code: 03

Mathematical analysis of complex water resource systems is extended to a statewide system. A number of alternative patterns and levels of demand for water are postulated for ten interconnected hydrologic study areas in the state of Utah. It has 204 constraints and 338 variables and is solved by the simplex method. Results show that the optimal least-cost system consists of the various combinations of groundwater, surface water, and interregional transfer activities which minimize the cost. Also included in the results are: shadow prices of the resources; sensitivity analyses to identify the critical cost coefficients in the optimal solution; parametric analyses to test the effects of changing constraints; and manipulations of the model to test operating rules, legal policies, political factors, institutional limitations, etc. Flow diagrams and graphs summarize the important information. The method developed in this study allows consideration of the full cost structure, rather than just part of the development costs.

ABSTRACT

Accession Number:
@ 254
Clyde, C.G., King, A.B., and Andersen, J.C., 1971, Application of operations research techniques for allocation of water resources in Utah: Utah Water Research Laboratory Rep. PRWG73-2, 132 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: COMPUTER MODELS, AVAILABLE WATER BY BASIN, UTAH, PRESENT WATER USE

Access Code: 011 Use Code: 02

In this report a methodology is described for determining the optimal allocation of water supplies in the State of Utah to minimize the cost of meeting an assumed set of water requirements. A linear programming model was formulated to represent the ten interconnected hydrologic study areas of the state. The comprehensive model considers virtually all users, areas, sources, transfers and costs of water. The model has 204 constraints and 338 variables and was solved by the simplex method. Data input includes amount of water transferred from the Colorado River Basin to the Great Basin, quantity of surface and ground water used in the ten hydrologic study units, quantity of water into storage, evaporation loss from reservoirs, return flows, groundwater recharge, and outflow from each unit.

Included in the results are the following: the optimal water allocation or the groundwater, surface water, and water transfers which minimize the cost; the shadow prices of the resources; sensitivity analyses to identify the critical cost coefficients in the optimal solution; parametric analyses to test the effects of changing constraints; and manipulations of the model to test other factors such as operating rules, legal policies, political and institutional limitations. The tabulated data were carefully condensed so as to be more easily understood. Flow diagrams and graphs summarize the important information. The work is fully documented so others can follow what was done and improve the method or apply the model to other areas.

ABSTRACT

Accession Number:
@ 254.1
Clyde, C.G., Falkenborg, D.H., and Riley, J.P., March 1976, Colorado River basin modeling studies: Proceedings of a seminar held at Utah State University, Logan, Utah, July 16-18, 1975, 616 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS, PROCEEDINGS, SALINITY, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 01

The purpose of this symposium, sponsored by Utah State University, was to provide a forum for reviewing, discussing and analyzing the interrelationship among management policies, computer modelling, and resource development options in the Colorado River basin. This proceeding presents technical paper that cover a broad spectrum of water-management issues, including water resource planning, legal and institutional constraints in the use of models, and a large number of existing hydrosalinity and other models of the Colorado River System. Some of the more relevant papers from this symposium are abstracted elsewhere in this bibliography.

Pages

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ABSTRACT

Accession Number:
@ 254.2
Clyde, E.W., 1978, Legal overview: current problems in water acquisition: Clyde and Pratt, in Water acquisition for mineral development, Tucson, AZ, Rep. CONF-780363, p. 31.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, WATER LAW

Access Code: 002 Use Code: 02

It is noted that significant amounts of water will have to be committed if coal and oil shale are going to play their assigned role in meeting our energy needs. In some areas like the Northern Great Plains area, it appears that Nature will make sufficient water available for energy development, but there are legal constraints, both there and elsewhere which are causing legal shortages. In water short areas, such as Utah, it is unlikely that sufficient water can be developed so that all those who want to develop oil shale and coal could proceed simultaneously. Considerations of putting water rights together in the West are discussed along with the nature of a state water and land appropriation system, environmental concerns, appropriation conflicts, and Indian water rights.

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ABSTRACT

Accession Number:
@ 254.3
Coffer, H.F., ans Christianson, A., July 1979, EPA program conference report; oil shale, proceedings of the EPA/Industry forum, Jan. 23-24, 1979: EPA Rep. EPA-600/9-79-025, 59 p.

Contact: Ed Bates (copy)

Key Categories: UTAH, COLORADO, ENVIRONMENTAL

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 255
Coffin, D.L., 1963, Colorado: in McGuinness, ed., The role of ground water in the national water situation, U.S. Geological Survey Water-Supply Paper 1800, p. 207-225.

Contact: USGS Library (loan)

Key Categories: COLORADO, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 03

This article is a chapter from a book which overviews the role of groundwater on a national scale. A single chapter is devoted to the groundwater situation in each state. The chapter on Colorado reviews the occurrence and use of groundwater in the state. It describes groundwater conditions for ten separate areas: High Plains; South Platte River basin; the Arkansas River basin; the Arkansas Valley artesian area; the Denver artesian basin; the San Luis Valley; alluvial stretches along the Colorado River and its tributaries; the Colorado Plateau area; the mountainous areas; and North, Middle, and South Parks in the Rocky Mountain. Each section discusses the occurrence of groundwater, present uses, and existing and potential problems.

ABSTRACT

Accession Number:
@ 256
Coffin, D.L., Welder, F.A., and Glanzman, R.K., 1971,
Geohydrology of the Piceance Creek structural basin between the White and Colorado Rivers, northwestern Colorado: U.S. Geological Survey Hydrologic Investigations Atlas HA-370, 2 sheets.

Contact: Public Inquiries Office (copy)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, SPRINGS

Access Code: 011 Use Code: 02

This atlas presents the results of an investigation of the water resources of part of the Piceance Creek structural basin in northwestern Colorado. The area of investigation is between the White and Colorado Rivers, an area of about 1,600 square miles in parts of Rio Blanco, Garfield, and Mesa Counties. The objective of the investigation was to describe availability, occurrence, and chemical properties of the water resources of the basin.

Sheet 1 describes the geology of the basin and presents a number of maps and cross sections, including a structure contour map of the base of the Mahogany Zone, contour maps showing the thickness of the low and high restivity zones, and an east-west structural contour map. Sheet 2 describes the climate and surface and groundwater hydrology of the basin. Potentiometric contour maps and geohydrologic sections are presented, and a number of wells and springs are located on the contour map. Several bar and other graphs and a table summarize available information on surface water quantity and quality.

ABSTRACT

Accession Number:
@ 257
Coffin, D.L., and Bredehoeft, J.D., 1969, Digital computer modeling for estimating mine drainage problems: U.S. Geological Survey Open-File Report, 24 p.

Contact: Open-File Services Section (copy)

Key Categories: COMPUTER MODELS, GROUNDWATER QUANTITY, COLORADO

Access Code: 011 Use Code: 03

This paper describes the use of the computer models to simulate the drainage of an oil shale mine in the Piceance basin. The paper presents the equations of flow for an anisotropic, nonhomogenous medium; discusses their finite-difference approximations; and describes the hydrology of the area where the equations were solved to predict the flow into a proposed open-pit mine. The mine was proposed to test the oil shale reserves in the Piceance Creek basin of western Colorado.

ABSTRACT

Accession Number:
@ 258
Coffin, D.L., Welder, F.A., Glanzman, R.K., and Dutton, X.W., 1968, Geohydrologic data from the Piceance Creek basin between the White and Colorado Rivers, Northwestern Colorado: U.S. Geological Survey Circular 12, Ground-Water Series, 39 p. + 2 plates.

Contact: USGS Library (loan)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

A study of the water resources in the Piceance Creek basin was begun in 1964 by the U.S. Geological Survey in cooperation with the Colorado Water Conservation Board. Interest in exploiting the extensive oil-shale deposits in the area prompted the study. The objectives of this investigation were to describe the water resources of the basin showing the availability, occurrence, and chemical properties of groundwater and surface water. This description will be the basis for developing water supplied and for coping with water problems associated with the exploitation of the oil resources. The report presents the basic data collected and discusses the results of pumping tests made during the study. The report presents the results of aquifer tests (drawdown and conductance as a function of time since start of pumping and well recovery data), presents logs of text holes and observation wells, and summarizes chemical and physical measurements of surface and groundwater quality. Hydrographs of Roan, Parachute, Yellow and Piceance Creeks are presented for water year 1965.

ABSTRACT

Accession Number:
@ 259
Collentine, M., Libra, R., Feathers, K.R., and Hamden, L., 1981, Occurrence and characteristics of ground water in the Great Divide and Washakie basins, Wyoming: Vols. VI-A and VI-B, Wyoming Water Resources Research Institute Report GW-WY-001, v. 6A and 6B, 110 p. plus appendices and plates.

Contact: EPA Region VIII Library (loan)

Key Categories: WYOMING, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, PRESENT WATER USE, SPRINGS

Access Code: 011 Use Code: 01

This report presents the findings of a groundwater study of the Great Divide and Washakie basins in south central Wyoming. The study was funded by the U.S. Environmental Protection Agency (EPA) for the Underground Injection Control (UIC) program. This groundwater report is one of seven which covers all of the state of Wyoming except for the Yellowstone National Park area. This report delineates, characterizes, and documents groundwater occurrence, flow, quality, and use in the Great Divide and Washakie basins. This information was developed for a field geologic reconnaissance of parts of the study area and adjacent areas; collection, screening, and analyses of existing water well and oil test well data; and review of previous reports.

Volume V-A of the report describes the population, land use, topography, drainage, structural geology, stratigraphy, geologic outcrops, and hydrostratigraphy in the study area. Industrial, agricultural, and public and private domestic water use is discussed and tabulated. Groundwater occurrence and flow patterns are defined and major water-producing zones are described. Groundwater quality is discussed and compared with drinking water standards. Appendices include tabulations of water produced from oil wells; detailed water use data, summaries of hydrologic properties of major water-bearing zones; records of wells and springs; a discussion of how to determine aquifer properties from yield-drawdown-duration data from constant yield well performance tests; and chemical analyses of groundwaters sampled by WRRI. Volume V-B consists of a series of maps which include: structure-contour maps of the top of Cloverly Formation; wells permitted for domestic use; and TDS maps for the Quaternary, Upper Tertiary, Tertiary, Mesaverde, Frontier, Cloverly, Sundance-Nuggett, and Paleozoic aquifers.

ABSTRACT

Accession Number:
@ 259.1
Colley, J.D., Gathman, W.A., and Owen, M.L., Sept. 1977, Emissions from synthetic fuels production facilities: v. I. executive summary, Radian Corp., Austin, TX, Rep. PB-283352, 25 p.

Contact: NTIS (copy)

Key Categories: SURFACE, EFFLUENTS

Access Code: 002 Use Code: 03

This report was compiled to provide the Environmental Protection Agency with an assessment of multi-media pollutants from oil shale processing and coal gasification facilities. The report examines oil shale and coal extraction methods in addition to fuel conversion processes. Three oil shale conversion processes are considered: the TOSCO II, Paraho, and Union Oil processes. The Lurgi process is considered for coal gasification. Process descriptions and module definitions are presented for each operation. Potential air emissions, water effluents, and solid wastes are then identified and quanitified for each module. Emissions of trace elements and organics are determined qualitatively. An assessment of resources required to support the production facilities is also included. The overall report is presented in two volumes. Volume I summarizes the objectives, the approach, and the results of the study. Volume II gives detailed descriptions of the methodology and the results.

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ABSTRACT

Accession Number:
@ 259.2
Colley, J.D., Gathman, W.A., and Owen, M.L., Sept. 1977, Emissions from synthetic fuel production facilities: v. II. report, Radian Corp., Austin, TX, Rep. PB-283353, 218 p.

Contact: NTIS (copy)

Key Categories: EFFLUENTS, SURFACE

Access Code: 002 Use Code: 02

This report was compiled to provide the Environmental Protection Agency with an assessment of multi-media pollutants from oil shale processing and coal gasification facilities. The report examines oil shale and coal extraction methods in addition to fuel conversion processes. Three oil shale conversion processes are considered: the TOSCO II, Paraho, and Union Oil processes. The Lurgi process is considered for coal gasification. Process descriptions and module definitions are presented for each operation. Potential air emissions, water effluents, and solid wastes are then identified and quanitified for each module. Emissions of trace elements and organics are determined qualitatively. An assessment of resources required to support the production facilities is also included. The overall report is presented in two volumes. Volume I summarizes the objectives, the approach, and the results of the study. Volume II gives detailed descriptions of the methodology and the results.

994

ABSTRACT

Accession Number:
@ 259.3
Collins, A.G., April 1974, Saline groundwaters produced with oil and gas: Rep. EPA-660/2-74-010, 68 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, GROUNDWATER QUALITY, SALINITY

Access Code: 011 Use Code: 02

This report summarizes the results of a study to collect brine analyses from most oil and gas producing sedimentary basins of the U.S. and to enter them into STORET. More than 60,000 saline water analyses were collected by the U.S. Bureau of Mines and screened to eliminate about 30,000 analyses; 20,000 were entered into STORET. Of this 20,000, 1,032 were from Colorado, 489 from Utah, and 5,000 from Wyoming.

This report discusses the saline water analyses stored in STORET, the methods used to identify a water source, saline water classification, the plotting of salinity maps for use in local or regional studies, the pollution of freshwater and land by brines, and the use of brines for desalination to produce freshwater and minerals.

Surface

998

ABSTRACT

Accession Number:
@ 259.4
Collins, D.L., 1981, Hydrologic reconnaissance of the U.S. Naval Oil Shale Reserve No. 1, Parachute drainage basin: in Water-resources investigations of the U.S. Geological Survey, U.S. Geological Survey Open-File Report 81-150, p. 105

Contact: Danny Collins (status)

Key Categories: COLORADO, SEDIMENT, CLIMATE, SURFACE, WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

The purpose of this program is to determine the present hydrologic conditions of the Naval Oil Shale Reserve No. 1. A data collection network consisting of five streamflow stations, two automatic sediment samplers, two precipitation gages, and one weather station was installed. Seven test wells have been completed, and aquifer tests have been conducted on three of them.

In the future, data collection will continue and a basic-data report will be prepared.

ABSTRACT

Accession Number:
@ 260
Colony Development Operation, 1974, An environmental impact analysis for a shale oil complex at Parachute Creek, Colorado, part I-plant complex and service corridor: Denver, Colorado Atlantic Richfield Company, operator 349 p.

Contact: BLM - Vernal, Craig (loan)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, PROCESS WATER USE, LEACHING, EFFLUENTS, RECLAMATION, SURFACE, ENVIRONMENTAL

Access Code: 011 Use Code: 01

This environmental impact analysis has been prepared for the Colony Development Operation's proposed construction of a commercial shale oil mine, plant, and related off-site facilities near Parachute Creek, Colorado. This analysis has been prepared as a comprehensive project document and includes a description and evaluation of the plant complex, the underground mine, a product pipeline from the plant to a connecting pipeline at Aneth, Utah, plant-related off-site facilities, utility and water supplies, and required socio-economic features. Supporting technical reports are included as appendices.

The four-part analysis is presented in three volumes together with a multi-volume Appendix. Volume I of the analysis contains Part I and consists of a description of the construction and operation of the plant and mine, a detailed examination of the environment of the Parachute Creek basin, an identification of the sources of environmental impacts related to this portion of the proposed activity, and a cumulative analysis of the effects of these impacts upon the local environment.

ABSTRACT

Accession Number:/
@ 261
Colony Development Operation, 1974, An environmental impact analysis for a shale oil complex at Parachute Creek, Colorado, part II - pipeline: Denver, Colorado Atlantic Richfield Company, operator 155 p. plus appendices.

Contact: BLM - Vernal, Craig (loan)

Key Categories: COLORADO, CLIMATE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, ENVIRONMENTAL

Access Code: 011 Use Code: 01

This environmental impact analysis has been prepared for the Colony Development Operation's proposed construction of a commercial shale oil mine, plant, and related off-site faciliteis near Parachute Creek, Colorado. This analysis hav been prepared as a comprehensive project document and includes a description and evaluation of the plant complex, the underground mine, a product pipeline from the plant to a connecting pipeline at Aneth, Utah, plant-related off-site facilities, utility and water supplies, and required socio-economic features. Supporting technical reports are included as appendices.

The four-part analysis is presented in three volumes together with a multi-volume Appendix.

Part II, describes the pipeline, the environment within the general vicinity of the proposed right-of-way, and the impacts which are expected to result from the consturction and operation of the piepline.

ABSTRACT

Accession Number:
@ 262
Colony Development Operation, 1974, An environmental impact analysis for a shale complex at Parachute Creek, Colorado, part III - socio-economic analysis offsite development and part IV - conclusion: Denver, Atlantic Richfield Company, operator.

Contact: BLM - Vernal, Craig (loan)

Key Categories: SURFACE, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This environmental impact analysis has been prepared for the Colony Development Operation's proposed construction of a commercial shale oil mine, plant, and related off-site facilities near Parachute Creek, Colorado. This analysis ha been prepared as a comprehensive project document and includes a description and evaluation of the plant complex, the underground mine, a product pipeline from the plant to a connecting pipeline at Aneth, Utah, plant-related off-site facilities, utility and water supplies, and required socio-economic features. Supporting technical reports are included as appendices.

The four-part analysis is presented in three vols. together with a multi-volume Appendix. Volume Three contains Parts III and Part IV. Part III sets forth a general analysis of existing socio-economic conditions with the Colorado River Corridor from Grand Junction to Glenwood Springs. The analysis includes an evaluation of the off-site impact which could result from potential settlement patterns of plant and mine employees and other employees attracted to the area by job opportunities in secondary service and commercial businesses. Part IV consists of a description of the land use plans and controls of the governmental authorities who will have jurisdiction over the proposed plant complex and pipeline and a cumulative evaluation of the overall impacts of the entire project as they relate to various public policies.

ABSTRACT

Accession Number:
@ 263
Colony Shale Oil Project, 1981, Annual report to Colorado Mined Land Reclamation Board.

Contact: Mike Day - Exxon (copy)
Colorado Mined Land Reclamation Board (loan)

Key Categories: COLORADO, RECLAMATION, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUALITY, CLIMATE, SURFACE, LEACHING

Access Code: 011 Use Code: 02

This is the 1981 annual report submitted by Colony to the Colorado Mined Land Reclamation Board. It contains a brief history and background of the Colony Project, it summarizes the status of construction and reclamation activities, and it discusses projected disturbances of acreage and cost of reclamation for these lands. It also presents Colony's plans for sediment control, top soil management, and revegetation and reclamation and updates progress on studies of solid waste disposal and fugitive dust control and presents the water quality monitoring program. A map shows the location of proposed or constructed ground and surface water monitoring sites.

ABSTRACT

Accession Number:
@ 263.1
Colorado Department of Health, Serial, NPDES compliance data: Water Quality Control Division, Denver, Colorado.

Contact: Stan May (access)

Key Categories: COLORADO, EFFLUENTS, SURFACE WATER QUALITY .

Access Code: 002 Use Code: 01

State and self-monitoring data on effluents from dischargers holding NPDES permits are on file at the Colorado Department of Health. This type of information is important for developing waste loads for water quality modeling and for determining the present quality of discharges from oil shale operations. This information is filed in three-ring binders by the name of the discharger. The water quality parameters included for each discharger depends upon those specified in the permit and usually include pH, BOD, and suspended solids. Twelve NPDES permits have been issued in the Colorado oil shale basin, including three to oil shale developers. These are:

Rio Blanco County

(1) Cathedral Bluffs Shale Oil Company
(2) Meeker Wastewater treatment facility (WWTF)
(3) Nielson's Inc.
(4) Rangely Sanitation District
(5) Rio Blanco Oil Shale Co.
(6) Stagecoach Sanitation, Inc. WWTF

Garfield County

(7) Rifle Falls Trout Hatchery
(8) Commercial Construction Co.
(9) Occidental
(10) Rifle WWTF
(11) Rifle Village So. Metropolitan District
(12) Union Carbide Corp. Rifle Mill

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997

ABSTRACT

Accession Number:
@ 263.2
Colorado Department of Health, 1982, Clean lakes study: study by
Water Quality Control Division, Denver, Colorado.

Contact: John Scherschligt (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

Section 314 of the Clean Water Act requires that each State identify and classify, according to eutrophic conditions, all publically owned fresh water lakes. They also must develop procedures and methods to control sources of pollution to these lakes and to restore the quality, as required. Clean lake planning for Colorado is in progress at the Water Quality Control Division, Department of Public Health.

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ABSTRACT

Accession Number:
@ 263.3
Colorado Department of Health, 1982, Low flow hydrology investigations: study by Water Quality Control Division, Denver, Colorado.

Contact: John Scherschligt (copy)

Key Categories: COLORADO, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 01

The purpose of this program is to provide 7 day - 10 year low flow figures for wasteload allocation and permitting programs. To accomplish this task, work was done in several areas. Statistical low flow information was retrieved through STORET for most of the USGS stations in the state. In addition, approximately 100 7 day - 10 year low flow estimates for ungaged stream segments were calculated. Basin-wide flow balancing type studies using diversion records were also done for Clear Creek, Bear Creek, Cherry Creek and were begun for the South Platte above Denver and the Fraser River. A continuation of this effort in response to NPDES permit needs to anticipated. In addition, the Division intends to pursue the possibility of cooperating with the USGS in a research project to more accurately estimate the low flow from ungaged mountain streams.

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ABSTRACT

Accession Number:
@ 263.4
Colorado Department of Health, 1982, Water quality assessment: study by Water Quality Control Division, Denver, Colorado.

Contact: John Scherschligt (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

Section 305 (b) of the Clean Water Act requires that each state submit biennially an assessment of water quality within the state. These reports must include: (1) descripton of quality of all navigable waters during the preceding year; (2) analysis of extent to which these waters are suitable for shellfish, fish, wildlife and recreational uses; (3) description of nature and extent of nonpoint sources of pollutants and recommendations to control these; and others.

The last such report was submitted to EPA by the Water Quality Control Division in 1980. During FY 1981, the Division prepared a water quality problem assessment which categorized the major water pollution problems statewide and ranked the severity of each. The known or suspected sources of pollution were also identified. The principle problems in or near the study are as follows: (1) Along Peru Creek, French Gulch, Upper Eagle River, Ten Mile Creek, Oak Creek, metals from active and abandoned mines are problematic; (2) Along the Colorado River below Dotsero and tributaries to the Colorado River in Mancos Shale area, dissolved solids from marine shales and irrigated lands are problematic.

1000

ABSTRACT

Accession Number:
@ 263.5
Colorado Department of Health, June 11, 1981, Rules and regulations and guidelines: Article 1: General; Article 2: Procedural regulations; Article 3: Water quality standards and classifications; Article 4: (to be assigned); Article 5: Universal regulations; Article 6: permits; Article 7: Regulations protecting groundwaters; Article 8: Agriculture; Article 9: Industrial regulations; Article 10; Regulations for effluent limitations: Water Quality Control Commission, Denver, Colorado.

Contact: Colorado Water Quality Control Commission (copy)

Key Categories: COLORADO, WATER LAW

Access Code: 011 Use Code: 01

These are the statutes which govern the quality of water in Colorado.

/1001

ABSTRACT

Accession Number:
@ 263.6
Colorado Department of Health, 1980, Status of water quality in Colorado: Water Quality Control Division, Denver Colorado, 8 p. plus appendices.

Contact: Bob Owen (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

This report series, prepared biannually for the U.S. EPA, describes the water quality of all navigable waters, analyzes the extent to which these waters provide for the protection and propagation of fish and wildlife and the protection of recreational activities, analyzes the environmental impacts and the social and economic costs to achieve compliance with PL 92-500, and describes the nature and extent of nonpoint sources of pollution.

The 1980 report highlights problem areas and relates present ambient water quality to existing and proposed standards and criteria. The focus is on in-stream quality. Colorado's water quality standards, present and in an appendix, are the comparative basis for characterizing water quality. Water quality is expressed by showing violations of the current standards and criteria.

1002

ABSTRACT

Accession Number:
@ 263.7
Colorado Dept. of Health, April 1974, Water quality management plan
for the Green River basin, 303e Plan, vol. I: Colorado Water
Quality Control Division, 130 p. plus appendix

Contact: Bob Owen (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, COMPUTER MODEL

Access Code: 002 Use Code: 01

This report assesses the existing water quality of the Green River basin and provides a planning guide for future water quality control to meet requirements of PL 92-500. The physiography, geology, climate, and hydrology of the basin are described, and population, economy, land use, and water resource plans are discussed. Point and non-point sources of water pollution are inventoried and potential future pollution sources are identified. Water quality standards, stream classification, water quality monitoring programs, and baseline water quality are described and pertinent data graphed.

Stream segments were classified according to the severity of pollution and water quality modeling was performed with EPA's Computer Program for the Study-State Water Quality Simulation of a Stream Network. This model requires the segmentation of a stream into sections of assumed constant hydrologic, physical and biological parameters. Pollution loads are added as point sources at the upper ends of the stream segments. The modeling was done for a segment of the Yampa River just below Steamboat Springs. This was used as the basis of effluent load allocations. The complete BOD-DO model study and a sensitivity analysis is contained in an appendix to the report.

The report concludes with a recommended management plan for the area.

ABSTRACT

Accession Number:
@ 264
Colorado Dept. of Natural Resources, Oct. 1979, Upper Colorado River basin 13(a) assessment, the availability of water for oil shale and coal gasification development in the Upper Colorado River basin: summary report, public review draft, prepared for U.S. Water Resources Council.

Contact: Colorado Dept. of Natural Resource (copy)

Key Categories: COLORADO, UTAH, WYOMING, AVAILABLE WATER BY BASIN, PROCESS WATER USE, PRESENT WATER USE

Access Code: 011 Use Code: 01

This study assesses the availability of water for oil shale and coal gasification developments in the Upper Colorado River Basin. The study analyzed a technology mix consisting of 26 unit-sized oil shale plants producing 1.3 million bbl/day and high Btu gasification industry of 8 unit-sized plants producing about 2 billion standard cubic feed per day of gas. The study summarizes present water uses and hydrologic conditions and presents projections of future conventional water uses. It estimtes potential consumptions of water by emerging energy technologies and discusses the legal and institutional factors that may affect the availability of water. Alternative means of supplying water, including development of surface supplies, transfers from irrigated agriculture, development of groundwater, weather modification, and improvements in efficiency of water use, are discussed, together with their potential impacts. Wastewater management for these two technologies is also briefly summarized.

ABSTRACT

Accession Number:
@ 265
Colorado Dept. of Natural Resources, 1978, Directions for the future, the Colorado water study: Denver, Colorado.

Contact: DRI (loan)

Key Categories: COLORADO, PRESENT WATER USE

Access Code: 042 Use Code: 02

In 1976, the Colorado state legislature directed that a "water study" by the Department of Natural Resources commence. Although the legislature did not specify the purposes of such a study, the Department of Natural Resources has defined the purposes of the Colorado Water Study as follows:

(1) Describe the existing legal, economic, and factual basis for the allocation and use of water in Colorado.

(2) Based on projections of ranges of future water demand, postulate different ways in which Colorado water could be used in the future.

(3) Analyze the consequences of the alternative uses of water, measuring those consequences in terms of fundamental economic, social, and environmental values.

(4) Describe various legal or institutional mechanisms now available, or available with changes in the law, which might be used to change the way water is distributed and used, should such changes be desired.

It should be emphasized that none of the above reports will make recommendations regarding the future use and distribution of water, nor will they recommend changes in existing laws and policies.

In five volumes generally corresponding to the purpose outlined above, the intent of the study is to provide a thorough basis for consideration and discussion of public of "direction for the future."

no 267

ABSTRACT

Accession Number:
@ 266
Colorado Dept. of Natural Resources, Nov. 1957, Water resources of Colorado: Denver, Colorado.

Contact: DRI (loan)

Key Categories: COLORADO

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 268
Colorado Geological Survey, Atlas of ground water quality in
Colorado: Map Series 16.

Contact: Colorado Geological Survey (copy)

Key Categories: GROUNDWATER QUALITY, COLORADO

Access Code: 052 Use Code: 01

The Atlas of Groundwater Quality in Colorado reports the findings of the Colorado Geological Survey's construction of a series of hydrological maps and cross sections depicting the hydrogeological conditions of all aquifers in Colorado found at a depth of less than 2,000 feet below the surface and whose waters contain less than 10,000 mg/l of total dissolved solids.

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1003

ABSTRACT

Accession Number:
@ 268.09
Colorado Mined Land Reclamation Division, Series, Oil shale mined land reclamation permits.

Contact: Colorado Mined Land Reclamation Division (access)

Key Categories: RECLAMATION, SURFACE, IN-SITU

Access Code: 002 Use Code: 01

Oil shale developers in Colorado have to obtain Mined Land Reclamation Permits which contain important information on spent oil shale disposal and site rehabilitation plans. The following oil shale developers have obtained such permits:

Cathedral Bluffs	77-530
EXXON/Colony	80-47
Occidental Oil Shale	77-424
Rio Blanco Oil Shale Co.	77-497
Superior Oil Co.	77-516 77-517
Union Oil Co.	78-263

1004

ABSTRACT

Accession Number:
@ 268.1
Colorado River Basin Salinity Control Forum, Dec. 1979, Water quality standards for salinity, Colorado River System: Third annual progress report, 33 p.

Contact: Colorado River Basin Salinity Control Forum (copy)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, PRESENT WATER USE

Access Code: 011 Use Code: 01

The Colorado River Basin Salinity Control Forum, which includes members from the states of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming, publishes an annual report which summarizes the results achieved by the salinity control program and of other actions in the basin on salinity of the Colorado River. This report presents information on changes occurring from October 18, 1978 through October 17, 1979. The report presents tabular summaries for the period 1973-1978 for (1) virgin flow at Lee Ferry; (2) end of calendar year active reservoir storage and storage changes; (3) estimated water use by state; and (4) flow-weighted average annual salinity at three stations. The status of salinity control programs being conducted by Bureau of Reclamation, Department of Agriculture, and Bureau of Land Management, and by the states is presented.

ABSTRACT

Accession Number:
@ 269
Colorado River Basin Salinity Control Forum, 1978, Proposed 1978 revision water quality standards for salinity including numeric criteria and plan of implementation for salinity control, Colorado River system.

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, WATER LAW

Access Code: 000

Use Code: 02

ABSTRACT

Accession Number:
@ 270
Colorado River Basin Salinity Control Forum, 1975, Proposed water quality standards for salinity including numeric criteria and plan of implementation for salinity control, Colorado River system: (June 1975) and supplement (August 26, 1975).

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, WATER LAW

Access Code: 000 Use Code: 02

1005

ABSTRACT

Accession Number:
@ 270.1
Colorado River Board of California, Aug. 1970, Need for controlling salinity of the Colorado River: 89 p.

Contact: none

Key Categories: COLORADO, UTAH, WYOMING, SALINITY

Access Code: 002 Use Code: 03

Results are presented of an appraisal of sources of salinity of the Colorado River. Probable increases in the River's salinity that will occur in the future, deleterious impact that such increases will have on California's users of Colorado River water, and possible measures for controlling the river's salinity are described. Recommendations are included for actions that, if effected, would tend to keep the river's salinity from increasing above its present high levels.

1004

ABSTRACT

Accession Number:
@ 270.2
Colorado School of Mines, 1981, Oil shale, the environmental challenges II: Petersen, K.K., ed., Golden, Colorado, Colorado School of Mines Press, [in press 1982].

Contact: Kathy Petersen (status)

Key Categories: PROCEEDINGS

Access Code: 011 Use Code: 01

The second annual symposium, "Oil Shale, The Environmental Challenges II," sponsored by the Oil Shale Task Force and U.S. Department of Energy, was held in Vail, Colorado, from August 10-13, 1981. The purpose of the Symposium was to present, discuss, and contrast industry, regulatory, and researcher views on the environmental and socioeconomic impacts of oil shale development. Eight separate sessions addressed Australian oil shale development, water management, air quality and control, solid waste management, revegetation, socioeconomic aspects, occupational health and safety, and risk analyses. In all of these sessions except those dealing with Australian oil shale and risk analysis, three separate presentations were given presenting the views on each topic of the regulator (state or federal), of the developer, and of the researcher. The research reviews summarize the state of knowledge in each field.

This proceedings contains the detailed technical papers and the transcripts of the panel discussions. The reviews that relate directly to water resources are abstracted elsewhere in this bibliography, as follows: Wildung and Zachara (Abstract No. 866); Redente and Doerr (Abstract No. 658).

ABSTRACT

Accession Number:
@ 271
Colorado School of Mines, Oct. 1975, Proceedings of the environmental oil shale symposium: Gary, J.H., ed., in Quarterly of the Colorado School of Mines, v. 70, no. 4, 244 p.

Contact: Colorado School of Mines (copy)

Key Categories: PROCEEDINGS

Access Code: 011 Use Code: 02

This annual proceedings of the Colorado School of Mines summarizes technical papers that were presented at the 8th Oil Shale Symposium. This symposium was devoted to environmental issues of oil shale development. The 19 papers in this volume cover environmental policy and regulations, environmental baseline programs at the federal lease tracts, reclamation, ecology, and archaeology.

ABSTRACT

Accession Number:
@ 272
Colorado School of Mines, Oct. 1976, Proceedings of the ninth oil shale symposium: Gary, J.H., ed., in Quarterly of the Colorado School of Mines, v. 71, no. 4, 344 p.

Contact: Colorado School of Mines (copy)

Key Categories: PROCEEDINGS

Access Code: 011 Use Code: 02

This annual proceedings of the Colorado School of Mines summarizes technical papers that were presented at the 9th Oil Shale Symposium. The majority of the papers deal with technical aspects of oil shale production. However, six of the papers address environmental and other issues, including process water requirements, health effects, and archaeology and cultural resource management.

ABSTRACT

Accession Number:
@ 273
Colorado School of Mines, July 1977, Proceedings of the tenth oil shale symposium: Gary, J.H., ed. 72(4)

Contact: Colorado School of Mines (copy)

Key Categories: PROCEEDINGS

Access Code: 011 Use Code: 02

This annual proceedings of the Colorado School of Mines summarizes technical papers that were presented at the 10th Oil Shale Symposium. The majority of the papers deal with technical aspects of oil shale production. However, two of the papers address environmental issues. The paper by Vranesh and Cope discusses legal issues related to the development of water for oil shale in western Colorado, while the paper by Fox and others discusses the partitioning of As, Cd, Cu, Hg, Pb, and Zn during simulated in-situ retorting.

ABSTRACT

Accession Number:
@ 274
Colorado School of Mines, 1978, Proceedings of the eleventh oil shale symposium: Gary, J.H., ed, 389 p. 73 (4)

Contact: Colorado School of Mines (copy)

Key Categories: PROCEEDINGS

Access Code: 011 Use Code: 01

This annual proceedings of the Colorado School of Mines summarizes technical papers that were presented at the 11th Oil Shale Symposium. The majority of the papers deal with technical aspects of oil shale production. However, 12 of the papers address environmental issues, including the EPA regulatory program, health and toxicology issues, mercury emissions, and water management considerations.

ABSTRACT

Accession Number:
@ 275
Colorado School of Mines, Aug. 1979, Proceedings of the twelfth oil shale symposium: Gary, J.H., ed, 395 p.

74(4)

Contact: Colorado School of Mines (copy)

Key Categories: PROCEEDINGS

Access Code: 011 Use Code: 01

This annual proceedings of the Colorado School of Mines summarizes technical papers that were presented at the 12th Oil Shale Symposium. The majority of the papers deal with technical aspects of oil shale production. However, 12 of the papers address environmental issues, including the EPA regulatory program, trace element partitioning, in-situ retort abandonment strategies, leaching, and toxicology.

ABSTRACT

Accession Number:
@ 276
Colorado School of Mines, 1980, Proceedings of the thirteenth
oil shale symposium: Gary, J.H., ed, 391 p. 75(4)

Contact: Colorado School of Mines (copy)

Key Categories: PROCEEDINGS

Access Code: 011 Use Code: 01

This annual proceedings of the Colorado School of Mines summarizes technical papers that were presented at the 13th Oil Shale Symposium. The majority of the papers deal with technical aspects of oil shale production. However, 16 of the papers address environmental issues, including abandonment of in-situ retorts, industry baseline environmental programs, characterization of effluents, socioeconomic impacts, leaching, and air emissions control.

no 278

ABSTRACT

Accession Number:
@ 277
Colorado School of Mines, 1981, Proceedings of the fourteenth
oil shale symposium: Gary, J.H., ed.

76(4)

Contact: Colorado School of Mines (copy)

Key Categories: PROCEEDINGS

Access Code: 011 Use Code: 01

This annual proceedings of the Colorado School of Mines summarizes technical papers that were presented at the 14th Oil Shale Symposium. The majority of the papers deal with technical aspects of oil shale production. However, twelve of the papers address environmental issues, including process water use and characterization, effluent treatment, revegetation, particulate control by wet scrubbing and characterization of aqueous stream from the scrubbers, and hydrogeologic consequences of in-situ retorting.

ABSTRACT

Accession Number:
@ 279
Colorado School of Mines, 1980, Oil shale, the environmental challenges: Petersen, K.K., ed., Golden, Colorado, Colorado School of Mines Press, 380 p.

Contact: Colorado School of Mines (copy)

Key Categories: PROCEEDINGS

Access Code: 011 Use Code: 01

A symposium "Oil Shale, The Environmental Challenges," sponsored by The Oil Shale Task Force and the U.S. Department of Energy, was held in Vail, Colorado, from August 11-14, 1980. The purpose of the Symposium was to present and discuss research on the environmental and socioeconomic impacts related to oil shale development. Major review presentation focused on evaluating the present state of knowledge and included recommendations for mitigation strategies based on current information. The review presentations were followed by panel discussions.

This proceedings contains the detailed state-of-art review papers and the transcripts of the panel discussions. Review papers are presented on the analysis of oil shale materials, characterization of oil shale effluents, industrial hygiene, biology and toxicology of oil shale materials, ecological effects, retort abandonment, reclamation, leaching and solid waste disposal, wastewater treatment, air quality, socioeconomic impacts and regulatory obstacles. The reviews that relate directly to water resources are abstracted elsewhere in this bibliography.

ABSTRACT

Accession Number:
@ 280
Colorado, State of, Water for tomorrow - Colorado State water plan:
U.S. Dept. of Interior, Bureau of Reclamation and the State of Colorado, Denver, Colorado.

Contact: DRI (loan)

Key Categories: COLORADO, AVAILABLE WATER, WATER LAW

Access Code: 042 Use Code: 02

The Colorado State Water Plan is defined by the following three phases: Phase I--Appraisal of Present Conditions, Phase II--Legal and Institutional Considerations, and Phase III--Plans for Development. Phase I is an appraisal of the water and related land resources and is also a summation of the current status of development and critical issues and problems concerning present water resource development and utilization in Colorado. The data are presented in the report by the State's four major river basins - Arkansas, Colorado, Missouri, and Rio Grande. Economic data are presented by economic areas which are essentially the same as the four major river basins. The base year for compiling data was 1970, except that earlier data were used when 1970 were unavailable. No projection of data for future conditions is included as part of this report.

Phase II, Legal and Institutional Considerations, scheduled for completion in March 1974, will provide for an analysis of the legal and institutional factors which have governed and will govern the development, use, and management of water and related land resources in the State.

Phase II, Plans for Development, scheduled for release later in 1974, will present alternative plans for the development and future available surface and groundwater supplies and related land resources to meet future needs and objectives. All potential ways for augmenting Colorado's water supplies will be identified including, weather modification, desalting, conservation and reuse of water, and surface water imports.

1007

ABSTRACT

Accession Number:
@ 280.1
Colorado State University, Water Resources Research Institute, 1980,
Abstracts of current water resources studies in Colorado, FY 1980:
Fort Collins, Colorado, 166 p.

Contact: Environmental Resources Center (copy)

Key Categories: BIBLIOGRAPHY, COLORADO

Access Code: 011 Use Code: 02

This report is an inventory of current water resource studies that were underway in Colorado during FY 1980. The information contained herein includes project title, expected duration, annual cost, performing and sponsoring agency, and an abstract. This information was obtained from an annual survey of state agencies including universities, federal agencies, regional councils of government and others. It is entered on a computerized data system and may be accessed by project title, key word, etc. by contacting Shirley Miller at Colorado Water Resources Research Institute, Colorado State University, Fort Collins, Colorado (303-491-5371). A more recent inventory of projects included in this data base is summarized in Abstract No. 281.

ABSTRACT

Accession Number:
@ 281
Colorado State University, Inventory of water studies in Colorado,
1980-81: Fort Collins, Colorado, Colorado Water Resources Research
Institute, 61 p.

Contact: Environmental Research Center (copy)

Key Categories: COLORADO, BIBLIOGRAPHY

Access Code: 011 Use Code: 01

This inventory lists the titles and performing agency of current water resource studies being performed in Colorado by state agencies including universities, federal agencies, regional councils of government and others. This information is obtained by sending survey forms to potential study performers on an annual basis. Information obtained during these surveys is entered into a computerized data base system and includes project title, expected duration, annual cost, performing and sponsoring agency and an abstract. This information may be accessed by project title, key words, etc. by contacting Shirley Miller at Colorado Water Resources Research Institute, Colorado State University, Fort Collins, Colorado (303) 491-5371.

ABSTRACT

Accession Number:
@ 281.1
Colorado State University, Dec. 1971, An environmental inventory of a portion of Piceance basin in Rio Blanco County, Colorado: Report prepared for Cameron Engineers, Inc., Denver, Colorado.

Contact: Environmental Resources Center (copy)

Key Categories: COLORADO, CLIMATE, WATER LAW, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 02

This report presents an inventory of environmental elements existing in a 216-square-mile area within Rio Blanco County in western Colorado. The inventory identifies and quantifies those components of the ecosystem which might be affected by development within the basin. Environmental elements are classified into six categories with a chapter for each: geomorphology; soils; water resources; climate; biota; and recreational, cultural and aesthetic values.

The water resources chapter broadly overviews surface and ground water quality and quantity in the Piceance Basin. It summarizes information available through 1971 and includes a partial list of water rights and tabular summaries of water quality data. The appendices to this section include exerpts from several documents that are difficult to obtain copies of.

The climate chapter includes a survey of characteristics and controls of the climate and air quality over the region. Monthly precipitation and temperature data are summarized for three stations within the area, Little Hills, Meeker, and Rangely.

1009

ABSTRACT

Accession Number:
@ 281.2
Colorado State University, Dec. 1971, Water pollution potential of spent oil shale residues: U.S. Environmental Protection Agency, Grant No. 14030EDB.

Contact: none

Key Categories: COLORADO, SURFACE WATER QUALITY, COMPUTER MODELS

Access Code: 002 Use Code: 02

Physical properties, including porosity, permeability, particle size distribution, and density of spent shale from three different retorting operations, (TOSCO, USBM, and UOC) have been determined. Slurry experiments were conducted on each of the spent shales and the slurry analyzed for leachable dissolved solids. Percolation experiments were conducted on the TOSCO spent shale and the quantities of dissolved solids leachable determined. The concentrations of the various ionic species in the initial leachate from the column were high. The major constituents, $SO_4^=$ and Na^+, were present in concentrations of 90,000 and 35,000 mg/l in the initial leachate; however the succeeding concentrations dropped markedly during the course of the experiment. A computer program was utilized to predict equilibrium concentrations in the leachate from the column. The extent of leaching and erosion of spent shale, and the composition and concentration of natural drainage from spent shale has been determined using oil shale residue and simulated rainfall.

Concentrations in the runoff from the spent shale have been correlated with runoff rate, precipitation intensity, flow depth, application time, slope, and water temperature.

1010

ABSTRACT

Accession Number:
@ 281.3
Colorado State University, Agricultural Experiment Station, 1971, List and location of snow courses and soil moisture stations: Fort Collins, Colorado, 16 p.

Contact: NTIS (copy)

Key Categories: COLORADO, CLIMATE

Access Code: 002 Use Code: 03

A list of 225 snow courses and soil moisture stations in Colorado and New Mexico shows the location and elevation for each station. The watersheds included in the list are: in Colorado -- South Platte River, Arkansas River, Upper Rio Grande, Gunnison River, Colorado River, Yampa River, White River, and North Platte River; in New Mexico -- the Rio Grande; and in Colorado and New Mexico -- San Miguel River, Dolores River, and San Juan River.

✓ 1011

ABSTRACT

Accession Number:
@ 281.4
Colorado Water Conservation Board, 1982, Colorado water study: background volume: draft dated July 7, 1981, Denver, Colorado.

Contact: Bill McDonald (status)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, PRESENT WATER USE, PROCESS WATER USE

Access Code: 002 Use Code: 01

This report reviews the present and future status of water availability and use in Colorado. It overviews present water supplies and depletion in Colorado and discusses the availability of surface water for the development of new supplies. Projected water consumption by economic sector is given through 1990. Appendices present population projections; scenarios for irrigated agricultural expansion; details of water consumption by steam-electric power generation, oil shale retorting, and coal gasification and liquefaction; and discuss the potential impact of municipal water use restrictions on future growth in the Colorado Front Range urban corridor.

ABSTRACT

Accession Number:
@ 282
Colorado Water Conservation Board, and U.S. Dept. of Agriculture,
April 1969, Water and related land resources, Yampa River Basin,
Colorado and Wyoming: Denver, Economic Research Service, Forest
Service, and Soil Conservation Service.

Contact: BLM - Craig (loan)

Key Categories: WYOMING, PRESENT WATER USE, SURFACE WATER QUALITY

Access Code: 102 Use Code: 03

This report presents information on water and related land resources of the Yampa River Basin in the states of Colorado and Wyoming. This is one of the series of cooperative river basin surveys being conducted on the Upper Colorado River and its tributaries on the western slope of the State of Colorado.

The principal objective of this study was to develop information on water and related land resource use and management with particular regard to multiple use, to provide a basis for coordinating USDA programs with the related activities of local, State, and other Federal agencies.

This study utilized applicable data from previous investigations wherever possible. The report is developed from field surveys and analysis of material collected from many sources. It is presented in the form of an inventory or information document rather than as an action or authorizing report.

Water and related land resource problems include erosion damage on rangeland and dry cropland, inefficient water management on irrigated lands, sediment and salinity production from exposed shale areas, floodwater damage from snowmelt runoff, range and forest fires, and a shortage of irrigation water for late season use. Present and future needs for water and related land resource development include erosion control practices, improved irrigation and drainage systems, increased efficiency in irrigation water management, proper range management, sediment control, water storage facilities for multiple use, recreation, and wildlife development.

ABSTRACT

Accession Number:
@ 283
Colorado Water Conservation Board, and U.S. Dept. of Agriculture, Nov. 1966, Water and related land resources White River Basin in Colorado: Denver, Economic Research Service, Forest Service, and Soil Conservation Service, 92 p.

Contact: BLM - Craig (loan)
DRI (loan)

Key Categories: SURFACE WATER QUANTITY, COLORADO, PRESENT WATER USE

Access Code: 011 Use Code: 03

This report presents information on water and related land resources of the White River Basin in the State of Colorado.

Information is presented about water and related land resource use and management which provides a basis for coordinating USDA programs of watershed protection, flood prevention, land and water management, and recreation with related activities of local, State and other Federal agencies. Information is also presented which will provide a basis for development of projects under the Watershed Protection and Flood Prevention Act, Public Law 566, as amended.

This study utilized applicable data from previous investigations wherever possible. The report is developed from field surveys and analysis of material collected from many sources. It is presented in the form of an inventory or information document rather than as an action or authorizing report.

ABSTRACT

Accession Number:
@ 284
Colorado West Area Council of Governments, July 1979, Colorado West Area 208 plan, final main report: Rifle, Colorado.

Contact: Bob Owen (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 002 Use Code: 01

This is the final 208 plan for the following four major river basins: Yampa River, White River, Upper Colorado River, and Lower Colorado River. The purpose of this plan, as specified in PL 92-500, is to identify and designate methods of control for pollution from municipalities, agriculture, mining, and other sources. This report identifies water quality problem areas and presents a nonpoint source data base (land ownership, soil association descriptions, land use, sediment, salinity, etc.) and population and land use projections. Existing water quality and hydrologic standards and criteria are discussed and a stream classifications is proposed. A control plan for point and non-point sources of pollution and for salinity is presented.

1012

ABSTRACT

Accession Number:
@ 284.1
Comptroller General of the United States, May 4, 1979, Colorado River basin water problems: how to reduce their impact: Rep. CED-79-11, Washington, D.C., 137 p.

Contact: none

Key Categories: COLORADO, UTAH, WYOMING, SALINITY, WATER LAW, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 01

This report analyzes major management problems with the Colorado River system, which drains 242,000 square miles in seven western states. The primary concern is that unless the appropriate local, state and federal agencies develop effective inter-cooperation, this seven state area will not be able to cope with a probable water shortage soon after the year 2000. Current water supply is insufficient to meet future demands and the current salinity control program may not be cost effective in achieving desired results. New methods of managing the basin's water resources are needed. The average annual flow of the river dropped 18% between 1903 and 1977. Salinity levels have increased due to a rise in usage through diversion of upstream water. New methods for managing the basin's resources include more local-federal agency conflict resolution and consideration of all water resources in the basin as a total system. The GAO recommends forming a politically sensitive basin task force to delineate and propose solutions to the issues outlined in this study. Appendices include identification of selected legislation and compacts affecting operations of the Colorado River, availability and use of groundwater, salinity control projects, efforts to conserve and augment water supply, and Indian water rights claims.

ABSTRACT

Accession Number:
@ 285
U.S. Congress, Senate, Committee on Energy and Natural Resources, Subcommittee on Energy Production and Supply, 1978, Water availability for energy development in the West: U.S. Government Printing Office, publication No. 95-134.

Contact: DRI (loan)

Key Categories: PROCEEDINGS, COLORADO, UTAH, WYOMING

Access Code: 000 Use Code: 01

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1013

ABSTRACT

Accession Number:
@ 285.1
Conkle, N., Ellzey, V., and Murphy, K., Oct. 1974, Environmental
considerations for oil shale development: Battelle Columbus
Laboratories, Columbus, Ohio, 114 p.

Contact: NTIS (copy)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 03

The report gives results of a preliminary literature survey of environmental considerations associated with the development of a shale oil industry in the U.S. The survey was not meant to be an exhaustive analysis of the environmental aspects of oil shale production. The study includes: oil shale deposits, mining and pretreatment processes, in-situ and ex-situ retorting, refuse disposal, and produce treatment and usage. The report provides an overview of the anticipated oil shale industry, including available resources and the likely technical and environmental problems to be encountered. It identifies specific technologies likely to be employed in the mining, oil extraction, and on-site upgrading processes. It also describes the development status of these technologies and their potential economic, resource, and environmental impacts upon the oil shale resource regions. The report notes research and development needs required to eliminate inadequacies in the data base necessary to evaluate potential environmental problems.

ABSTRACT

Accession Number:
@ 286
Connor, J.G., and others, 1958, A compilation of chemical quality data for ground and surface waters in Utah: Utah Dept. of Natural Resources, Division of Water Rights Technical Publication 10, 276 p.

Contact: USBR - Salt Lake City Library (loan)

Key Categories: UTAH, SURFACE WATER QUALITY, GROUNDWATER QUALITY

Access Code: 002 Use Code: 02

Report is a compilation of all available information that existed on chemical quality of ground and surface waters in Utah. Data in the report were supplied by a number of Federal, State, and local agencies. Chemical analyses of water from wells and springs collected through 1957 are tabulated and grouped by counties. Chemical analyses of surface water collected at stations on a daily or weekly basis during the 1955 water year are tabulated, and data prior to 1955 are summarized. For daily or weekly water-quality stations that were discontinued prior to the 1955 water year, the latest annual record is shown, and prior record is summarized.

ABSTRACT

Accession Number:
@ 287
Conroy, L.S., 1980, Hydrologic and climatologic data, southeastern Uinta Basin, Utah and Colorado, water year 1978: U.S. Geological Survey Open-File Report 80-1025 (also published as Utah Hydrologic-Data Report 34), 166 p.

Contact: USGC-Salt Lake City (copy)

Key Categories: UTAH, COLORADO, CLIMATE, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SPRINGS

Access Code: 011　　　　Use Code: 01

This report contains hydrologic and climatologic data that were collected as a part of an investigation of the southeastern Uinta Basin, Utah and Colorado, by the U.S. Geological Survey. This report contains data mainly for the 1978 water year, which includes the period October 1977-September 1978. Conroy and Fields (1977) reported data collected mainly for water years 1975 and 1976, and Conroy (1979) reported data collected mainly for water year 1977.

The report includes tables which summarize data on: (1) monthly precipitation (2) depth-duration of rainfall; (3) snow depth and water content; (4) air temperature; (5) stream-discharge and water-quality at continuous-and-partial-record stations; and (6) groundwater quality, temperature, specific conductance, and water levels.

ABSTRACT

Accession Number:
@ 288
Conroy, L.S., 1979, Hydrologic and climatologic data, southeastern Uinta Basin, Utah and Colorado, water year 1977: U.S. Geological Survey Open-File Report 79-1493 (also published as Utah Hydrologic-Data Report 33), 193 p.

Contact: USGS-Salt Lake City (copy)

Key Categories: UTAH, COLORADO, CLIMATE, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SPRINGS

Access Code: 011 Use Code: 01

This report contains hydrologic and climatologic data that were collected as a part of an investigation of the southeastern Uinta Basin, Utah and Colorado, by the U.S. Geological Survey. This report contains data mainly for the 1977 water year, which includes the period October 1976-September 1977. Conroy and Fields (1977) reported data collected mainly for water years 1975 and 1976.

The report includes tables which summarize data on: (1) monthly precipitation; (2) depth-duration of rainfall; (3) snow depth and water content; (4) air temperature; (5) stream-discharge and water-quality data at continuous-record stations; (6) water-quality and streamflow at partial-record stations; (7) descriptions of ground-water sampling sites; (8) quality of groundwater; (9) water levels, temperature, and specific conductance in selected wells.

ABSTRACT

Accession Number:
@ 289
Conroy, L.S., and Fields, F.K., 1977, Climatologic and hydrologic data, southeastern Uinta Basin, Utah and Colorado, water years 1975 and 1976: U.S. Geological Survey Utah Basic-Data Release No. 29, 244 p.

Contact: Stefanie Oppenheimer - USGS (loan)

Key Categories: CLIMATE, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, COLORADO, UTAH, SEDIMENT

Access Code: 011 Use Code: 01

This report presents climatologic and hydrologic data that were collected as part of an investigation of the southeastern Uintah Basin conducted by the U.S. Geological Survey. The objectives of the study were to: (1) define the natural hydrologic system according to occurrence, use, quantity, and quality of water; (2) characterize the climatic factors which influence hydrologic systems; (3) determine the effect of oil-shale development on the hydrologic systems; and (4) develop hydrologic simulation models.

The report includes tables which summarize: (1) monthly precipitation; (2) snow depth; (3) monthly pan evaporation; (4) soil moisture; (5) continuous record streamflow data (conductance, temperature, sediment, water quality); and (6) ground water data (temperature, specific conductance, water levels, water quality).

This report is part of a series of publications sponsored by the U.S. Geological Survey which present the results of an intensive effort to collect information on the water reources of the Uintah Basin. Other volumes are Basic Data Release No. 33 (Conroy, 1979) for Water Year 1977, and Basic Data Release No. 34 (Conroy, 1980) for Water Year 1978. The series was terminated after Basic Data Release No. 34.

/014

ABSTRACT

Accession Number:
@ 289.1
Cook, C.W., March 1979, Rehabilitation potential and practices of Colorado oil shale lands: progress report, June 1, 1978 - May 31, 1979, Colorado State University, Fort Collins, 363 p.

Contact: NTIS (copy)

Key Categories: SURFACE, RECLAMATION

Access Code: 000

Use Code: 02

ABSTRACT

Accession Number:
@ 290
Cook, C.W., June 1974, Surface rehabilitation of land disturbances resulting from oil shale development: Fort Collins, Colorado State University, Information Series no. 11, 56 p..

Contact: none

Key Categories: SURFACE, RECLAMATION, PROCESS WATER USE

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 291
Cook, C.W., and Redente, E.F., Feb. 1980, Reclamation studies on oil shale lands in northwestern Colorado: Colorado State University Rep. COO-4018-4, U.S. DOE Rep. DOE/EV/4018-4, 64 p.

Contact: Ed Redente (copy)
NTIS (copy)

Key Categories: SURFACE, RECLAMATION

Access Code: 011 Use Code: 02

The overall objective of this project is to study the effects of various reclamation practices on above- and belowground ecosystem development associated with disturbed oil shale lands in northwestern Colorado. Plant growth media that are being used in field test plots include retorted shale, soil over retorted shale, subsoil materials, and surface disturbed topsoils. Some of the more significant results are: (1) a soil cover of at least 61 cm in conjunction with a capillary barrier provided the best combination of treatments for the establishment of vegetation and a functional microbial community, (2) aboveground production values for native and introduced species mixtures are comparable after three growing seasons, (3) cover values for native species mixtures are generally greater than for introduced species, (4) native seed mixtures, in general, allow greater invasion to occur, (5) sewage sludge at relatively low rates appear to provide the most beneficial overall effect on plant growth, (6) cultural practices, such as irrigation and mulching have significant effects on both above- and belowground ecosystem development, (7) topsoil storage after 1.5 years does not appear to significantly affect general microbial activities but does reduce the mycorrhizal infection potential of the soil at shallow depths, (8) population of mycorrihizal fungi are decreased on severely disturbed soils if a cover of vegetation is not established, (9) significant biological differences among ecotypes of important shrub species have been identified, (10) a vegetation model is outlined which upon completion will enable the reclamation specialist to predict the plant species combinations best adapted to specific reclamation sites, and (11) synthetic strains of two important grass species are close to development which will provide superior plant materials for reclamation in the West.

ABSTRACT

Accession Number:
@ 292
Cook, E.W., May 1, 1971, Organic acids in process water from Green River oil shale: in Chemistry and Industry, p. 485.

Contact: Denver Public Library (loan)

Key Categories: EFFLUENTS, SURFACE

Access Code: 011 Use Code: 02

This brief article presents the results of analysis of alkanoic acids in TOSCO II retort water. About 1-2 g/l acids or about 100 mg of acids per kg of shale feed were found. The straight-chain carboxylic acids predominated and accounted for about 82 weight percent of all acids.

ABSTRACT

Accession Number:
@ 293
Coomes, R.M., 1976, Health effects of oil shale processing: in
Quarterly of the Colorado School of Mines, v. 71, no. 4, p. 101-123.

Contact: Colorado School of Mines (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 03

This article summarizes the types of polycylic aromatic hydrocarbons (PAH) in oil shale products, presents concentrations of benzo(a)pyrene (BaP) in surface spent shales and compares these with common materials from the environment. This information is used to assess the implications of the presence of PAHs in oil shale products. The results of biological testing of oil shale materials is also presented.

ABSTRACT

Accession Number:
@ 294
Cordes, E.H., Dec. 1969, Hydraulic testing and sampling of USBM-AEC Colorado Core Hole 3, Rio Blanco County, Colorado: U.S. Geological Survey Open-File Report Oil Shale-6, 42 p.

Contact: Open-File Services Section (copy)

Key Categories: GROUNDWATER QUALITY, GROUNDWATER QUANTITY, COLORADO

Access Code: 142 Use Code: 02

On November 21, 1967, the U.S. Geological Survey, in cooperation with the U.S. Bureau of Mines and the U.S. Atomic Energy Commission, completed the hydraulic testing and sampling of USBM-AEC Colorado Core Hole 3 in Rio Blanco County, Colorado. This hole was drilled to explore the site for Project Bronco, a Plowshare experiment to study the feasibility of in situ retorting of oil shale after breaking the rock with a nuclear explosion.

The hydraulic tests indicate the existence of a highly permeable water-bearing zone in the upper and middle parts of the Parachute Creek Member of the Green River Formation of Eocene age. The zone yielded water in excess of 2,700 cubic meters per day (500 gallons per minute). During geologic time and even today, natural ground-water circulation is believed to have dissolved the syngenetic salt deposits from a part of the oil shale formations leaving a highly permeable zone of interconnected vugs and breccia channels. Older rocks underlying the Parachute Creek Member are comparatively impermeable to water flow and yielded less than 16 cubic meters per day (30 gallons per minuted) of highly saline (49,000 parts per million dissolved solids) fluid.

Potential flooding of a rubble chimney is an important consideration for project feasibility and safety. A first approximation of the magnitude of flooding was calculated from the test data.

ABSTRACT

Accession Number:
@ 295
Cordova, R.M., and others, 1971, Groundwater conditions in Utah, spring of 1971: Utah Dept. of Natural Resources, Cooperative-Investigations Report No. 9, 72 p.

Contact: Utah Division of Water Resources (copy)
USGS - Salt Lake City (copy)

Key Categories: GROUNDWATER QUANTITY, GROUNDWATER QUALITY, PRESENT WATER USE, UTAH

Access Code: 011 Use Code: 03

This is the eighth in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow. It also contains supplementary data that are related to groundwater use in some areas.

The report includes individual discussions of the most important areas of groundwater withdrawals in the State for the calendar year 1970. Water-level fluctuations, however, are described for the period spring 1970 to spring 1971.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-70. Other information that encompasses the study area is combined with data from other parts of the State.

ABSTRACT

Accession Number:
@ 296
Cordova, R.M., and others, 1968, Groundwater conditions in Utah, spring of 1968: Utah Dept. of Natural Resources, Cooperative-Investigations Report No. 6, 105 p.

Contact: Utah Division of Water Resources (copy)
USGS - Salt Lake City (copy)

Key Categories: GROUNDWATER QUANTITY, GROUNDWATER QUALITY, UTAH

Access Code: 011 Use Code: 03

This is the fifth in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow. It also contains supplementary data that are related to groundwater use in some areas.

The report includes individual discussions of selected major areas of groundwater withdrawals in the State for the calendar year 1967. Water-level fluctuations, however, are described for the period spring 1967 to spring 1968. Included for the first time in this series of annual reports is a (1) summation of the withdrawal of water from wells in the 5 years 1963-67 and (2) maps and discussions of water-level changes for the 5-year period, 1963-68.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-68. Other information that encompasses the study area is combined with data from other parts of the State.

√ /1015

ABSTRACT

Accession Number:
@ 296.1
Costa, J.E., and Jarrett, R.D., 1980, Debris flows in small mountain stream channels of Colorado, and their hydrologic implications: Association of Engineering Geologists Bulletin.

Contact: Bob Jarrett (copy)

Key Categories: COLORADO, SEDIMENT

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 297
Costin, L.S., Aug. 1981, Failure surface model for oil shale: Sandia National Laboratory Rep. SAND-81-1128, 43 p.

Contact: NTIS (copy)

Key Categories: IN-SITU, SUBSIDENCE

Access Code: 002 Use Code: 02

One promising means of recovering oil from oil shale is to retort the shale in situ. Currently, modified in situ technology requires the construction of extensive underground openings or retorts. The remaining media (structure left around these retorts must support the overburden and contain the retorting shale. A failure criterion for oil shale, which is presented in this paper, was developed so that regions in the retort structure where the shale may be approaching failure can be identified. This criterion, adapted from composite materials applications, is essentially a closed surface in six-dimensional stress space and makes it possible to describe the anisotropic nature of failure in layered materials. The failure surface can be defined by five parameters which are determined from five simple laboratory tests. The surface is developed for a 80 ml/kg kerogen content shale and its features are discussed in detail. The predictions of the model are found to be in agreement with the results of a large number of laboratory tests, including uniaxial and triaxial compression tests. One unique (for rocks) test series is discussed which involves the failure of thin-walled tubes under combined compression and torsion. Finally, it is shown how the model can be extended to include the variation of material properties with kerogen content and temperature.

1016

ABSTRACT

Accession Number:
@ 297.1
Cotter, J.E., and others, 1978, Sampling and analysis research program at the Paraho shale oil demonstration plant: U.S. Environmental Protection Agency Rep. EPA-600/7-78-065, 71 p.

Contact: Ed Bates (copy)

Key Categories: LEACHING, EFFLUENTS, SURFACE,

Access Code: 011 Use Code: 02

A sampling and analysis research program was conducted at the Paraho oil shale retorting demonstration site at Anvil Points, Colorado. The overall objective of the test program was to obtain preliminary quantitative and qualitative measurements of air, water, and solid compositions, and to gain experience that would lea to improved sampling procedures and the determination of priorities for sampling ar analysis of shale oil recovery operations. Selection of sample locations was based on need for information on process streams relative to emissions and effluents expected in a full-scale plant.

Samples taken included the recycle gases (H_2S, SO_2, NO_x, NH_3, and trace organics), recycle condensate, product oil/water, processed shale discharged from retorts, and dust in the vicinity of crushing, screening, and conveying equipment. A variety of laboratory analysis methods were used, including wet chemical analysis, spark source mass spectrometry, high pressure liquid chromatography, thin layer chromatography, gel permeation chromatography, and gas chromatography/mass spectrometry methods (GC/MS). Condensate water inorganic analyses were done for calcium, magnesium, sodium and potassium salts, ammonia, gross parameters, and trace elemen Condensate and product water samples were also analyzed for organic neutrals (part ularly aromatics), organic acids, and organic bases. Elemental determinations of bot retorted shale and raw shale particulates were made.

✓ 1017

ABSTRACT

Accession Number:
@ 297.2
Cowan, M.S., Cheney, R.W., and Addiego, J.C., 1981, An executive
summary of the Colorado River Simulation System, 12 p.

Contact: USBR - Denver (copy)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS

Access Code: 011 Use Code: 01

This report provides a general description of the U.S. Bureau of Reclamation's Colorado River Simulation System (CRSS). This is a deterministic digital computerized simulation model in accordance with the "Laws of the River." The model estimates the effect on future quantity and quality of water in the river for proposed changes in operations or for various alternative development scenarios.

The complete documentation of the CRSS is contained in eight parts: (1) CRSS Executive Summary; (2) Volume I Model: User's Manual; (3) Volume II Model; Programmer's Manual; (4) SMDID User's Manual; (5) Upper Colorado River Hydrology Data Base; (6) Lower Colorado River Hydrology Data Base; (7) TAPEDIT User's Manual; and (8) MHYDRO User's Manual. Additional information and documentation on this model may be obtained by contacting: U.S. Bureau of Reclamation, Engineering and Research Center, Mail Stop D-752 (CRSS), P.O. Box 25007, Denver Federal Center, Denver, CO 80225 (303) 234-2027.

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1018

ABSTRACT

Accession Number:
@ 297.3
Craig, G.S., Jr., 1970, Synthesizing hydrographs for small semiarid drainage basins: U.S. Geological Survey Research 1970, Chapter D, Professional paper 700-D, p. D238-D243.

Contact: Public Inquires Office (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

Studies of hydrograph shape for 14 small (less than 11 sq. mi.) drainage basins led to the development of a possible standard dimensionless hydrograph for semiarid regions. The dimensionless hydrograph, described in detail, was developed with data from small, ephemeral streams in Wyoming. Hydrographs are synthesized from the dimensionless hydrograph by using peak discharge-volume relationships. Only the single-peak event is considered. Synthetic hydrographs produced from the Wyoming dimensionless hydrograph show close agreement with observed hydrographs from Wyoming, New Mexico, and Arizona. The procedure can be used to define a hydrograph for any selected design value of peak freouency.

ABSTRACT

Accession Number:
@ 298
Craig, G.S., Jr., and Rankl, J.G., 1978, Analysis of runoff from
small drainage basins in Wyoming: U.S. Geological Survey
Water-Supply Paper 2056, 70 p.

Contact: Public Inquiries Office (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY, FLOODS

Access Code: 011 Use Code: 01

A flood-hydrograph study has defined the magnitude and frequency of flood volumes and flood peaks that can be expected from drainage basins smaller than 11 square miles in the plains and valley areas of Wyoming. Rainfall and runoff data, collected for 9 years on a seasonal basis (April through September), were used to calibrate a rainfall-runoff model on each of 22 small basins. Long-term records of runoff volume and peak discharge were synthesized for these 22 basins.

Flood volumes and flood peaks of specific recurrence intervals (2, 5, 10, 25, 50, and 100 years) were then related to basin characteristics with a high degree of correlation. Flood volumes were related to drainage area, maximum relief, and basin slope. Flood peaks were related to drainage area, maximum relief, basin slope, and channel slope.

An investigation of ponding behind a highway embankment, with available storage capacity and with a culvert to allow outflow, has shown that the single fast-rising peak is most important in culvert design. Consequently, a dimensionless hydrograph defines the characteristic shape of flood hydrographs to be expected from small drainage basins in Wyoming. For design purposes, a peak and volume can be estimated from basin characteristics and used with the dimensionless hydrograph to produce a synthetic single-peak hydrograph. Incremental discharges of the hydrograph can be routed along a channel, where a highway fill and culvert are to be placed, to help determine the most economical size of culvert if embankment storage is to be considered.

1019

ABSTRACT

Accession Number:
@ 298.1
Crandall, D.L., 1969, Streamflow forecasting, a vital element in water management: in Proceedings 37th annual meeting of Western Snow Conference, April 15-17, 1969, Salt Lake City, Utah, p. 92-96.

Contact: Engineering Research Center (copy)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

Within the constraints of operating the reservoirs of the Colorado River storage project to meet compact delivery requirements for fish and wildlife, float boaters and other recreationists, to control floods, help highway bridge builders, and aid water deliveries for communities, farms and industries, there is still opportunity to attempt optimum use of the available water for power production. The bulk of the cost of the storage project is being paid by power production. Project water use comes in the form of electric energy over a wire. Project power income is now about $20 million per year. With the combined effect of streamflow plus the head versus volume relationship being unique at each reservoir with a powerplant, the distribution of storage among the reservoirs is aimed at developing maximum systems energy and capacity. The streamflow forecasting method used by the Bureau of Reclamation is based on a correlation of streamflow at a particular site with the accumulated precipitation at selected gaging stations plus snow depths at specific courses within the contributing drainage basin. Above Glen Canyon Dam, the Bureau uses precipitation stations and 48 snow courses. Emphasis is placed on the application of the probability of the forecast runoff deviating from the actual runoff. Most management decisions recognize a deviation range exceeded less than one out of ten times in the past.

/1020

ABSTRACT

Accession Number:
@ 298.2
Crawford, A.B., and Peterson, D.F., eds., 1974, Environmental management in the Colorado River basin: Proceedings of conference, Oct. 15-16, 1973, Salt Lake City, Utah, Utah University Press, 313 p.

Contact: Utah State University Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL, PROCEEDINGS

Access Code: 002 Use Code: 02

Background for considering environmental management in the basin is provided by surveys of the problems confronting basin-wide planning, and by the use of environmental indices and the concept of carrying capacity in planning. Topics considered individually are recreation, agriculture, energy development, transportation, and organization. Also, the international implications of salinity, the future of regional planning in the United States, the prospects for environmental legislation in the United States and future research needs are considered.

ABSTRACT

Accession Number:
@ 299
Crawford, K.W., and others, July 1977, A preliminary assessment of the environmental impacts from oil shale developments: U.S. Environmental Protection Agency Rep. EPA-600/7-77-069, 189 p.

Contact: Ed Bates (copy)

Key Categories: SURFACE, ENVIRONMENTAL, COLORADO, UTAH

Access Code: 011 Use Code: 03

The report is a summary of major oil shale extraction and retorting development activities. The potential impacts on the physical environment which could result from commercial oil shale development are discussed relative to sources, properties, and quantities of wastes. The report describes existing air, water, and land resources in northwestern Colorado and northestern Utah. The identification of potential impacts of oil shale development on these resources, pollution control technologies and management plans are reviewed. Potential hazards associated with refining and end use of shale oil products are evaluated. The major environmental monitoring and impact studies are identified, and the scope of oil shale development projects is assessed.

ABSTRACT

Accession Number:
@ 300
Criddle, W.D., and Jensen, D.W., 1964, Water Laws of Utah and interstate compacts and treaties: 2nd Edition, comps.--Salt Lake City, Utah: Utah, Office of the State Engineer.

Contact: DRI (loan)

Key Categories: UTAH, WATER LAW

Access Code: 042 Use Code: 03

This volume contains the legislative enactments, affecting the waters of the State of Utah, that have taken place up to and including the 1963 session of the legislature.

1021

ABSTRACT

Accession Number:
@ 300.1
Christiansen, J.E., 1966, Estimating pan evaporation and evapotranspiration from climatic data: Irrigation and Drainage Specialty Conference, Las Vegas, NV., Nov. 2-4, 1966, p. 193-234.

Contact: Denver Public Library (loan)

Key Categories: UTAH, CLIMATE

Access Code: 002 Use Code: 02

Pan evaporation formulas, developed at Utah State University, provide a satisfactory procedure for estimating pan evaporation when such data are not available. The tables presented make application of the revised formula very convenient. Where climatic data are available, pan evaporation can be estimated with a fair degree of accuracy for practically all climatic conditions. Use of tables for the coefficients and their logs makes the pan evaporation formula easy to apply.

✓ 1022

ABSTRACT

Accession Number:
@ 300.2
Crookston, R.D., and Merino, J.M., 1977, Reclamation of spent oil shale, 1977 American Mining Congress Paper 7, San Francisco, California, set no. 5, p. 31.

Contact: Joe Merino (copy)

Key Categories: RECLAMATION, SURFACE,

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 301
Cruff, R.W., 1975, Estimating mean streamflow in the Duchesne River Basin, Utah: Utah Dept. of Natural Resources, Technical Publication No, 48, 18 p. plus 1 plate.

Contact: Utah Division of Water Rights (copy)
USGS - Salt Lake City (copy)

Key Categories: SURFACE WATER QUANTITY, UTAH

Access Code: 011 Use Code: 01

Monthly, annual, and long-term mean streamflow were estimated for streams in the Duchesne River basin by use of the monthly measurement method. Monthly measurements were attempted at 44 sites in the basin during the 1971 and 1972 water years. Some measurements could not be made because some sites were not accessible at all times, some of the streams did not have flow at all times, or some of the streams could not be measured during high flow. For those sites at which measurements could not be made, monthly discharge was determined by an alternative method involving the use of daily hydrographs for nearby gaging-station sites.

Four of the monthly measurement sites were at discontinued gaging stations, and two others were located so that their total discharge would be approximately the same as that for another discontinued gaging station. A comparison of long-term mean annual discharge determined by the monthly measurement method versus that determined from gaging-station records was as follows: Good at three sites (8 percent or less), fair-to-poor at one site (39 percent), and poor at one site (87 percent). At the three sites that showed good comparisons, there was flow at every monthly visit and the sites were above most diversions. The site where comparision was fair-to-poor is affected by upstream diversion; at the site where the comparison was poor, the stream was dry at the time of many of the monthly visits.

ABSTRACT

Accession Number:
@ 302
Cruff, R.W., and Hood, J.W., 1976, Seepage study of the Rocky Point Canal and the Grey Mountain-Pleasant Valley canal systems, Duchesne County, Utah: Utah Dept. of Natural Resources, Technical Publication 50, 53 p. plus 4 plates.

Contact: Utah Division of Water Rights (copy)
USGS - Salt Lake City (copy)

Key Categories: SURFACE WATER QUANTITY, UTAH

Access Code: 011 Use Code: 03

A study of the gains or losses of the Rocky Point Canal System and the Grey Mountain-Pleasant Valley canal system, Duchesne County, Utah, was made to aid in the water allocation of the canal systems. Four sets of seepage runs were made along each of the canals from May 1972 to June 1973. Adjustments for fluctuations in flow in the canals were made from information obtained from water-stage recorders operated at selected locations along the canal during the time of each seepage run and from a time-of-travel study.

Although significant gains and losses were found for specific reaches of the canals, the net loss for the Rocky Point Canal system, which is 96,800 feet (29,500 metres) in length, amounted to 3.4 cubic feet per second (0.10 cubic metre per second) or about 6 percent of the capacity of the canal. The net loss for the Grey Mountain-Pleasant Valley Canal system, which is 160,300 feet (48,860 metres) in length, was 24.5 cubic feet per second (0.69 cubic metre per second) or about 8 percent of the canal's capacity. Qualitative evaluation of the geohydrology of the study area indicates an estimated return of canal loss to the river system of about 20 percent, or 5.6 cubic feet per second (0.16 cubic metre per second).

ABSTRACT

Accession Number:
@ 303
Culbertson, W.J., Nevens, T.D., and Hollingshead, R.D., Oct 1970, Disposal of oil shale ash: in Quarterly of the Colorado School of Mines, v. 65, no. 4, p. 89-132.

Contact: Colorado School of Mines (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 03

This article summarizes the results of studies on the geotechnical and leaching properties of raw shale from the Colony mine, of TOSCO spent shale, and of laboratory-retorted spent shale. Raw shales from above and below the Mahogany Marker were collected and burned at various temperatures and reidence times in laboratory reactors.

This article reports the results of chemical analyses; density and strength; measurements and leachate studies using these samples. Graphs of dry density as a function of water added, of unconfined compressive strength as a function of storage time, and of Mohr rupture envelopes are presented for most samples. Cementing properties of the spent shale are explored and the effect of burning temperature and time on cementation is investigated. Sequential batch leachates were performed to determine the major ions in the leachate and to assess the effect of retorting conditions on leachate quality. The articles include graphs of Ca and Na concentrations as a function of retorting conditions.

✓ 1023

ABSTRACT

Accession Number:
@ 303.1
Cummings, R.G., and McFarland, J.W., Jan. 1977, Reservoir management and the water scarcity issue in the Upper Colorado River basin: Natural Resource Journal, v. 17, no. 1, p. 81-96.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS, PRESENT WATER USE

Access Code: 002 Use Code: 02

An investigation was conducted to find optimum levels of water use commitments in the upper basin of the Colorado River within a context that allows for the evaluation of alternative estimates of flow-regimes in the Colorado River, and storage as it relates to these commitments. A framework for evaluating water allocation policies is outlined. The analytical model used is based on several assumptions as to the physical, political, institutional and socio-economic structure of the basin. The results are presented and the implications for policy and further research discussed. Studies concerning the ramifications of basin-wide management of water must begin soon if they are to include the potential for the conjunctive management of surface and groundwaters; discussing concerning flow augumentation alternatives must move into the evaluative stage in order that feasible alternatives may be included in discussions as to options available in the upper Colorado region.

ABSTRACT

Accession Number:
@ 504
Dale, R.H., and Weeks, J.B., May 1978, Hydrologic analysis of the U.S. Bureau of Mines' underground oil-shale research-facility site, Piceance Creek Basin, Rio Blanco Country, Colorado: U.S. Geological Survey Water-Resources Investigations 78-28,35 p.

Contact: Public Inquiries Office (copy)

Key Categories: COLORADO, GROUNDWATER QUALITY, GROUNDWATER QUANITY

Access Code: 011 Use Code: 01

The U.S. Bureau of Mines plans to develop an underground oil-shale research facility near the center of Piceance Creek basin. The oil-shale zone, which is to be penetrated by a shaft, is overlain by 1,400 feet of sedimentary rocks, primarily sandstone and marlstone, consisting of two aquifers separated by a confining layer. Three test holes were drilled by the U.S. Bureau of Mines to obtain samples of the oil shale, and to test the hydraulic properties of the two aquifers. The data collected during construction of the test holes were used to update an existing ground-water-flow computer model. The model was used to estimate the maximum amount of water that would have to be pumped to dewater the shaft during its construction. Based on the model, it is estimated that it would be necessary to pump as much as 3,080 gallons per minute to keep the shaft dry. Disposal of waste water and rock are the principal hydrologic problems associated with constructing the shaft.

1024

ABSTRACT

Accession Number:
@ 304.1
Dalstead, Norman L., and Green, John W., March 1981, Water use by coal-fired power plants in 1975: U.S. Dept. of Agriculture, Economics and Statistics Service Staff Report No. AGESS810326.

Contact: BLM - Craig (loan)

Key Categories: PRESENT WATER USE

Access Code: 102 Use Code: 02

The contents of this report are a part of a project entitled "Integrated Assessment: Economic and Social Consequences of Coal and Oil Shale Development." This project is supported jointly by the U.S. Department of Agriculture (USDA) and the Environmental Protection Agency (EPA) as a component of the Federal Interagency Energy/Environment Research and Development Program. The overall project focuses on identifying and analyzing certain interrelationships between society's need for energy, environmental quality, and agricultural production and the impacts of alternative public policy strategies for dealing with these needs.

The content of this report is a descriptive summary of water use and consumption by coal-fired electric power plants of over 100 MW in the U.S. in 1975. The data presented represents the initial effort in establishing the water use data base. Subsequent research will address the use and consumption of water by existing and planned power plants through 1985.

ABSTRACT

Accession Number:
@ 305
Dames and Moore, 1974, Climatology at Parachute Creek, Colorado: in Appendix 13 of the An environmental impact analysis for a shale oil complex at Parachute Creek, Colorado, Colony Development Operation, Denver, Colorado, 46 p. plus appendix.

Contact: BLM - Craig (loan)
BLM - Vernal (loan)

Key Categories: COLORADO, CLIMATE

Access Code: 011 Use Code: 02

This report summarizes the results of a field study to measure meteorological parameters for both valley and mesa locations in the vicinity of Colony's Dow West Property. The resulting data are correlated with simultaneous measurements at proximate long-term weather stations and used to derive probability distributions for source parameters. Six stations were established and measurements recorded for all or some of the following: wind direction, wind speed, temperature, relative humidity, precipitation.

The report summarizes the analysis of the first 14 months of data. The detailed data are tabulated and interpreted.

√ 1025

ABSTRACT

Accession Number:
@ 305.1
Dana, G.F., July 1968, Bureau of Mines-Atomic Energy Commission Colorado corehole No. 3, Rio Blanco County, Colorado: BOM Open-File Rep., 44 p.

Contact: Pete Dana (copy)

Key Categories: COLORADO, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 03

The drilling of Colorado Corehole No. 3 (CCH No. 3) was a part of a cooperative program with the Atomic Energy Commission (AEC) to investigate sites for pilot experiments concerning in situ processing of oil shale. The well was drilled to evaluate a potential site for a subsurface nuclear explosion designed to fracture oil shale in place. This paper presents the procedures for the drilling of the well and results obtained. Two other wells were previously drilled by the USBM in the northwestern part of the Piceance Creek basin to obtain data on the subsurface oil shale deposits.

This report presents drilling and coring history and the results of water, borehole photography, stratigraphic, and oil yield tests and analyses. The report summarizes water production as a function of depth and presents TDS measurements.

ABSTRACT

Accession Number:
@ 306
Dana, G.F , 1962, Ground water reconnaissance study of the state of
Wyoming: Wyoming Natural Resource Board.

Contact: Wyoming State Engineer's Office (loan)

Key Categories: WYOMING, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 062 Use Code: 02

This reconnaissance report presents general data and interpretations on groundwater in all of Wyoming except Yellowstone and Grand Teton National Parks. The majority of the report is divided into several individual sections, each of which covers one or more geologic basins (Denver-Julesberg, Laramie-Hanna-Shirley, Washakie-Red Desert, Green River, Wind River, Big Horn, and Powder River basins).

Part 4, which covers the Green River Basin, reviews previous reports on groundwater in the area, discusses the geologic structure, and identifies and describes aquifers present in the area. The volume and quality of groundwater are qualitatively described. Tables and figures present lithology and areas of reported groundwater occurrences, diagrammatic Southwest-Northeast cross section sharing water zones, well summaries (location, depth, water-bearing formation, etc.), and a map showing well locations. This well data includes a complete inventory of oil and gas wells that produced water and state and federal wells, complete through 1962.

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1026

ABSTRACT

Accession Number:
@ 306.1
Danielson, K.S.G., Sherk, W., Jr., and Grant, L.O., 1976, Legal system requirements to control and facilitate water augmentation in the western United States: The Denver Journal of International Law and Policy, v. 6, special issue, p. 511-525.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 02

Problems of water augmentation are twofold. First is the complexity of the weather modification aspect of water augmentation. These fundamental problems are environmental, social, and legal; second, legal uncertainties concerning water augmentation will necessarily involve the issue of water rights. The different approaches to water ownership in the western United States is examined, with emphasis on a recent Supreme Court of Colorado decision to the question of the ownership of water produced by water augmentation activities. Water augmentation activities include weather modification and watershed management techniques. These techniques will require legal system responses to protect both water rights holders and the general populace. Areas examined regarding legal system requirements include: state claims to water, water for weather modification, water from augmentation, and artificial water. Possible legal system responses are suggested and the legal and political obstacles are analyzed.

ABSTRACT

Accession Number:
@ 307
David E. Fleming Company, Oct 27, 1977, Possible reduction of estimated water supplies of the Rangely project by senior rights not operated in the CORSIM II computer simulation studies.

Contact: BLM - Denver Special Projects Office (loan)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 308
David E. Fleming Company, Jan. 1975, Base problem file, White River basin.

Contact: BLM - Denver Special Projects Office (loan)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN

Access Code: 000 Use Code: 03

1027

ABSTRACT

Accession Number:
@ 308.1
Davis, G.H., and Kilpatrick, F.A., Feb. 1981, Water supply as a limiting factor in Western energy development: Water Resources Bulletin, v. 17, no. 1, p. 29-35.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN, PROCESS WATER USE, IN-SITU, SURFACE, ENVIRONMENTAL

Access Code: 002 Use Code: 01

Conflicts between water allocation for agriculture and energy development in the water-dificient Western U.S. are discussed. Of the nation's 137 billion tons of strippable coal, 103 billion tons are located in the upper Colorado and upper Missouri River basins. Virtually all of the nation's high grade shale oil reserves lie in the upper Colorado basin. Projected uses for energy development through the year 2000 are about equal to those projected for agriculture, and together account for most of the remaining water allocation. Agricultural interests are facing increased costs and decreased supplies. Detailed development plans for an in-situ (80% retorted in the ground) prototype oil shale lease show water consumption estimates of 4,440 acre feet yer year for a 76,000 BPD (barrel per day) output. A conventional technology plant would consume three times the water per barrel of oil produced. Environmental acceptablility, uncertainty of water supplies, and distance for markets have thus far discouraged Western energy development.

ABSTRACT

Accession Number:
@ 309
Davis, G.H., and Wood, L.A., 1974, Water demands for expanding energy development: U.S. Geological Survey Circular 703, 14 p.

Contact: Public Inquiries Office (copy)

Key Categories: COLORADO, WYOMING, UTAH, PRESENT WATER USE, PROCESS WATER USE, SURFACE

Access Code: 011 Use Code: 02

This report summarized water demands for the extraction, transport, refining, conversion, and steam-electric generation of conventional sources of energy and for synfuels, including oil shale, coal gasification, and coal liquefaction.

Water is used in producing energy for mining and reclamation of mined lands, onsite processing, transportation, refining, and conversion of fuels to other forms of energy. In the East, South, Midwest, and along the seacoasts, most water problems are related to pollution rather than to water supply. West of about the 100th meridian, however, runoff is generally less than potential diversions, and energy industries must compete with other water users. Water demands for extraction of coal, oil shale, uranium, and oil and gas are modest, although large quantities of water are used in secondary recovery operations for oil. The only significant use of water for energy transportation, aside from in-stream navigation use, is for slurry lines. Substantial quantities of water are required in the retorting and the disposal of spent oil shales. The conversion of coal to synthetic gas or oil or to electric power and the generation of electric power with nuclear energy require large quantities of water, mostly for cooling.

Withdrawals for cooling of thermal-electric plants is by the far the largest category of water use in energy industry, totaling about 170 billion gallons (644 million m^3) per day in 1970.

Water availability will dictate the location and design of energy-conversion facilities, especially in water deficient areas of the West.

ABSTRACT

Accession Number:
@ 310
de Nevers, N., and others, Feb. 1978, Analysis of the environmental control technology for oil shale development: Rep. COO-4043-1, College of Engineering, Univ. of Utah, Salt Lake City, Utah, 301 p.

Contact: Charles Grua (copy)

Key Categories: EFFLUENTS, SURFACE, IN-SITU, RECLAMATION, ENVIRONMENTAL

Access Code: 011 Use Code: 03

The environmental control technology proposed in the various oil shale projects which are under development are examined. The technologies for control of air pollution, water pollution, and for the disposal, stabilization, and vegetation of the processed shale are thoroughly investigated. Although some difficulties may be encountered in any of these undertakings, it seems clear than the air and water pollution problems can be solved to meet any applicable standard. There are no published national standards against which to judge the stabilization and vegetation of processed shale. However, based on the goal of producing an environmentally and aesthetically acceptable finished processed shale pile, it seems probable that this can be accomplished. It is concluded that the environmental control technology is available to meet all current legal requirements. This was not the case before Colorado changed their applicable Air Pollution regulations in August of 1977, the previous ones for the oil shale region were sufficiently stringent to have caused a problem for the current stage of oil shale development. Similarly, the federal air-quality, non-deterioration regulations could be interpreted in the future in ways which would be difficult for the oil shale industry to comply with. The Utah water-quality, non-deterioration regulations could also be a problem. Thus, the only specific regulations which may be a problem are the non-deterioration parts of air and water quality regulations. The unresolved areas of environmental concern with oil shale processing are mostly for the problems not covered by existing environmental law, e.g., trace metals, polynuclear organics, ground water-quality changes, etc. These may be problems, but no evidence is yet available that these problems will prevent the successful commercialization of oil shale production.

ABSTRACT

Accession Number:
@ 311
Delaney, R., July 1965, The necessity of water storage for the oil shale industry: in Quarterly of the Colorado School of Mines Press, Golden, Colorado, v. 60, no. 3, p. 295-302.

Contact: Colorado School of Mines (copy)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN

Access Code: 011 Use Code: 03

This paper presents a brief historical perspective on the issue of water supply development for oil shale in western Colorado. It broadly discusses water issues, water planning, and water developments that were important in the early 1960s.

ABSTRACT

Accession Number:
@ 312
DeLong, L.L., 1982, Water quality of springs and streams in the Green River and Great Divide Basins, Wyoming: U.S. Geological Survey Water-Resources Investigations [in preparation 1982-1983].

Contact: Hugh Lowham (status)

Key Categories: WYOMING, SURFACE WATER QUALITY, SPRINGS, SURFACE WATER QUALITY, COMPUTER MODELS

Access Code: 002 Use Code: 01

This interpretative report focuses on water quality and quantity of springs and streams in the Green River Basin. Available data are evaluated using statistical methods and water quality models. Regression equations describing the relationship between flow and TDS are presented for gauging stations in the region. A computer model was used to evaluate the effect on water quality of increased withdrawals from the Big Sand Reservoir. Spring data were analyzed to determine the geologic source of springs.

~~Project summary~~ /

1028

ABSTRACT

Accession Number:
@ 312.1
Delong, L.L., 1981, Quality of runoff from small basins in plains areas--Wyoming: project summary in Water-resources investigations of the U.S. Geological Survey in Wyoming, Fiscal Year 1980, Open-File Report 81-20, p. 95-96.

Contact: Lew Delong (status)

Key Categories: WYOMING, SALINITY, SURFACE WATER QUALITY

Access Code: 011 Use Code: 01

The specific objectives of this study are to identify dominant processes involved in the divestment and transport of major dissolved salts within a small basin and to document the methods of short-term data collection and interpretation used so that they may be applied to other similar basins. The study is being conducted in southcentral Sweetwater County.

Streamflow and water-quality data will be collected intensively during runoff events. Multiple samples will be collected along stream reaches. Mass balances computed at sampling sites will be used to determine sources and sinks of salts in intervening reaches thus identifying the dominant processes by which constituents become waterborne and are transported. The final report will document the processes identified and the methods of data collection and interpretation utilized.

ABSTRACT

Accession Number:
@ 313
DeLong, L.L., 1977, An analysis of salinity in streams of the Green River basin, Wyoming: U.S. Geological Survey Water-Resources Investigations 77-103, 32 p.

Contact: Public Inquiries Office (copy)

Key Categories: WYOMING, SALINITY, COMPUTER MODELS

Access Code: 011 Use Code: 01

Dissolved-solids concentrations and loads can be estimated from streamflow records using a regression model derived from chemical analyses of monthly samples. The model takes seasonal effects into account by the inclusion of simple-harmonic time functions. Monthly mean dissolved-solids loads simulated for a 6-year period at U.S. Geological Survey water-quality stations in the Green River Basin of Wyoming agree closely with corresponding loads estimated from daily specific-conductance records. In a demonstration of uses of the model, an average gain of 114,000 tons of dissolved solids per year was estimated for a 6-year period in a 70-mile reach of the Green River from Fontenelle Reservoir to the town of Green River, including the lower 30-mile reach of the Big Sandy River.

ABSTRACT

Accession Number:
@ 314
Denver Research Institute, 1982, The effects of MIS retorting on groundwater/mineralogy interactions: University of Denver.

Contact: Jim Butz (status)

Key Categories: LEACHING, IN-SITU, COMPUTER MODELS

Access Code: 042 Use Code: 02

This is an on-going research project at the Denver Research Institute which is funded by the EPA, Aida, Oklahoma. The purpose of this program is to develop and test a comprehensive model to predict the interaction of groundwater in the Piceance Basin with modified in situ oil shale retort sites. The proposed work includes review and analysis of published and unpublished data on hydrology, water chemistry, and mineralogy; laboratory investigations on the effect of retorting on mineralogy and on solid-liquid phase chemistry; development and validation of a digital computer model that includes hydrodynamic dispersion; and field verification studies. The literature review portion of this study has been completed and is included in this bibliography under Fitzpatrick, 1982 (Abstract No. 366.2)

ABSTRACT

Accession Number:
@ 315
Denver Research Institute, and Colorado State University, Department of Civil Engineering, 1981, Water and energy in Colorado's future: the impacts of energy development on water use in 1985 and 2000: prepared for the Colorado Energy Research Institute.

Contact: none

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, WATER LAW

Access Code: 002 Use Code: 02

This in-depth study of the complex relationship between energy development and water use in Colorado is based on both facts and assumptions relating to differing levels of energy development from 1985 to 2000. Of obvious importance to policymakers, planners, and citizens, it considers current policy options and projects their probable consequences. The book also examines Colorado's water and energy resources, water requirements for energy development, how energy development will affect water quality and allocation, and legal factors relevant to water use for energy development.

Research for this volume was prepared by the University of Denver Research Institute and the Department of Civil Engineering at Colorado State University.

ABSTRACT

Accession Number:
@ 316
Deseret Generation & Transmission Cooperative, Inc., Dec. 1979,
Position statement on the Rangely Reservoir.

Contact: BLM - Denver Special Projects Office (loan)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 317
Dewsnup, R.L., and Jensen, D.W., 1977, State laws and instream flows: Fish and Wildlife Service Rep. FWS/OBS-77/27, 76 p.

Contact: NTIS (copy)

Key Categories: WATER LAW, UTAH, WYOMING, COLORADO

Access Code: 002 Use Code: 02

This publication examines water laws regarding instream flow reservations for 13 western States. The report also identifies strategies available for reserving flows and presents in a matrix form the legal basis for each strategy on a State-by-State basis.

ABSTRACT

Accession Number:
@ 318
Dewsnup, R.L., and Jensen, D.W., 1977, Strategies for reserving flows for fish and wildlife: identification, description, and preliminary evaluation: Fish and Wildlife Service Rep. FWS/OBS-77/26, 706 p.

Contact: NTIS (copy)

Key Categories: WATER LAW, UTAH, WYOMING, COLORADO

Access Code: 002 Use Code: 02

This report contains an extensive overview of Federal laws, State laws, water quality laws, and interstate compacts as they relate to the provision of instream flows for fish and wildlife purposes.

ABSTRACT

Accession Number:
@ 319
Dewsnup, R.L., and Jensen, D.W., eds., 1973, A summary--digest of state water laws: Arlington, Virginia, National Water Commission.

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, WATER LAW

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 320
Dewsnup, R.L., Jensen, D.W., Hoben, E., Horak, G., Lewis, M., and Nelson, W., 1977, Promising strategies for reserving instream flows: Fish and Wildlife Service Rep. FWS/OBS-77/29, 64 p.

Contact: Western Energy and Land Use Team (copy)

Key Categories: WATER LAW, COLORADO, UTAH, WYOMING

Access Code: 011 Use Code: 02

The report contains descriptions of 26 strategies, or methods for reserving instream flows under existing laws. Each description provides guidance on the level of organizational action, legal bases for each strategy, plus implementation advantages, disadvantages and costs. The forward is an introduction to State water laws in the West, and how legal traditions relate to instream flow.

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1029

ABSTRACT

Accession Number:
@ 320.1
DiBenedetto, P.J., July 1981, A combined powdered activated carbon-activated sludge wastewater treatment process for the treatment of alternative fuels process water: M.S. Thesis, Dept. of Civil Engineering, University of Wyoming, Laramie, Wyoming.

Contact: Dick Poulson (loan)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 002 Use Code: 02

The effects of powdered activated carbon (PAC) addition to an activated sludge wastewater treatment process for the treatment of oil shale, coal gasification, and tarsands process waters was the primary concern of this research. A total of five retort waters were examined at various concentrations ranging from 6.25% to 100.0%. A manometric technique (Warburg respirometer) was used to determine the oxygen uptake rates of an activated sludge with and without the addition of PAC (100 mg/l) at temperatures of 4°, 15°, 25° and 35°C.

It was determined that a PAC-activated sludge treatment process showed substantial increases in specific oxygen uptake rates when the system was subjected to moderately high concentrations of potentially toxic, organic substances as compared to a non-PAC system. Results indicating an optimum level of PAC for the activated sludge system were also noted.

The addition of PAC to a conventional activated sludge process significantly improved biochemical oxygen demand (BOD) and chemical oxygen demand (COD) removals as compared to a non-PAC-activated sludge process. These removals compared quite favorably to those found in the literature.

✓ 1030

ABSTRACT

Accession Number:
@ 320.2
Dickson, J.G., Adams, V.D., Manwaring, J.H., Sorensen, D.L., and Porcella, D.G., June 1980, Detection of chemical mutagens in extracts of spent oil shale using the Ames test: in oil shale symposium: sampling, anlaysis and quality assurance, Gale, C., ed., Rep. EPA-600/9-80-022, p. 473-491.

Contact: Ed Bates (copy)

Key Categories: LEACHING, SURFACE,

Access Code: 011 Use Code: 02

The Ames/Salmonella-microsome test was applied to determine the carcinogenic potential of spent oil shale. Solutions of chemicals suspected to be present in extracts of spent oil shale, as well as samples of soxhlet-extracted spent shale, were assayed. Results indicate at least three different unknown chemical mutagens exist in the extracts of two spent shales. Data is also presented regarding the effect of solvent on the mutagenic response of the Ames test and the possibility that chemical interactions may mask the detection of certain mutagens in chemical mixtures.

ABSTRACT

Accession Number:
@ 321
Dickson, J.G., and Adams, V.D., May 1980, Evaluation of mutagenicity testing of extracts from processed oil shale: Utah Water Research Laboratory, Utah State University, Water Quality Series UWRL/Q-80/01, 44 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 02

The Ames/Salmonella mutagenicity assay was used to screen spent shale extracts (Union, Paraho, TOSCO) for potentially carcinogenic chemicals. Positive mutagenic activity was detected in organic solvent extracts of all four spent shales tested. This result combined with the fact that most carcinogens (90 percent) have been detected as mutagens in the Ames test, indicates that these extracts contain carcinogens. Aqueous extracts of spent shale exhibited marginal or no mutagenic response, presumably because the techniques for extracting and concentrating trace quantities of these nearly water-insoluble compounds are inadequate.

√ 1031

ABSTRACT

Accession Number:
@ 321.1
Deimer, J.A., and Wengert, N., Oct. 1977, Water for energy: an approach to comprehensive impact assessment: Water Resources Bulletin, v. 13, no. 5, p. 885-893.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL, COMPUTER MODELS

Access Code: 002 Use Code: 02

The effects of energy development on the water resources of the Colorado River and great basin regions are expected to be substantial. Complex physical, economic and institutional interactions may by expected. Most research on these impacts appears single purpose, fragmented, uncoordinated, and often inaccessible to potential users, particularly to those with responsibility for energy/water policy and program decisions. A comprehensive, integrative framework for assessing alternative water allocation decisions is outlined, with a heuristic decision making model for evaluating impacts on maximization of gross (or net) regional product and regional social welfare, and for assessing the region's contribution to national economic objectives. The suggested model provides a structure for application and intergration of data of various kinds to a range of situations arising from possible impacts from energy proposals. The focus is on water/energy relationships but the model may provide a framework for comprehensive analysis of a variety of environmental actions and resulting system perturbations and effects.

1032

ABSTRACT

Accession Number:
@ 321.2
Dixon, N.P., and others, June 1970, Developing a hydro-quality-simulation model: Utah Water Research Laboratory Rep. PRWG67-1, 87 p.

Contact: NTIS (copy)

Key Categories: UTAH, COMPUTER MODELS, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

The development of a river basin simulation model comprising dissolved oxygen, temperature, specific electrical conductance, and basin hydrology submodels is demonstrated. The system model is the device for studying practical questions involving some measure of efficiency - whether this be pollution minimization by treatment and flow regulation or in developing more comprehensive water laws. These questions can be ascertained by simulation of altered conditions, sensitivity analysis, or some optimization technique, although the model in this report was developed for a specific prototype system, the Little Bear River in Utah, the approach, the methods and the conceptual framework can be transferable to other systems.

ABSTRACT

Accession Number:
@ 322
Dougan, P.M., 1981, BX in situ oil shale project - quarterly technical progress report for the period March 1-May 31, 1981: U.S. DOE Rep. DOE/LC/10747-T3, 43 p. plus Appendices A-D.

Contact: U.S. Government Printing Office (copy)

Key Categories: EFFLUENTS, MONITORING IN-SITU, COLORADO

Access Code: 000 Use Code: 02

1033

ABSTRACT

Accession Number:
@ 322.1
Dougan, P.M., March 1981, BX in situ oil shale project, annual technical progress report for the period March 1, 1980 - Feb. 28, 1981 and quarterly technical progress report for the period Dec. 1, 1980 - Feb. 28, 1981: Rep. DOE/LC/10747-T1, 35 p. plus appendices.

Contact: NTIS (copy)
LTEC Library (loan)

Key Categories: COLORADO, CLIMATE

Access Code: 002 Use Code: 01

This is an annual/quarterly technical progress report on the BX in-situ oil shale project. Appendix A-1 of this report summarizes the meteorological data collected from a mechanical weather station located at the ridge site along Black Sulphur Gulch during the months of June, July, and August 1980. The report tabulates monthly wind speeds and directions and temperatures and present a wind rose.

ABSTRACT

Accession Number:
@ 323
Dougan, P.M., Sept. 1980, BX in situ oil shale project, quarterly technical progress report for June 1 - August 31, 1980: U.S. DOE Rep. FE-1747-13, 11 p. plus Appendices.

Contact: NTIS (copy)

Key Categories: CLIMATE, COLORADO

Access Code: 011 Use Code: 02

This is a quarterly technical progress report on the BX in-situ oil shale project. Appendix E to this report summarizes the meteorological data collected from a mechanical weather station located at the ridge site along Black Sulphur Gulch from March 1, 1980 through May 31, 1980. The report tabulates monthly wind speeds, wind direction, and temperatures and presents a wind rose.

1034

ABSTRACT

Accession Number:
@ 323.1
Dougan, P.M., March 1980, BX in situ oil shale project, annual technical progress report for period March 1, 1979 - Feb. 29, 1980 and quarterly technical progress report for period Dec. 1, 1979: U.S. DOE Rep. DOE/LC/10747-11, 248 p.

Contact: U.S. Government Printing Office (copy)

Key Categories: COLORADO, CLIMATE

Access Code: 011 Use Code: 02

This is an annual technical progress report on the BX in-situ oil shale project. Appendix H to this report summarizes the meterological data collected from a mechanical weather station located at the ridge site along Black Sulphur Gulch during the months of September, October, and November 1979. The report tabulates monthly wind speeds and directions and temperatures and presents a wind rose.

ABSTRACT

Accession Number:
@ 324
Dougan, P.M., Feb. 1980, Geology and geohydrology elements of the environmental research plan, BX in situ oil shale project, Rio Blanco County, Colorado.

Contact: U.S. Government Printing Office (copy)

Key Categories: COLORADO, GROUNDWATER QUANTITY

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 325
Dougan, P.M., Dec. 1978, BX in situ oil shale project, quarterly technical progress report for the period Sept. 1 - Nov. 30, 1978: U.S. DOE Rep. FE-1747-7, 64 p.

Contact: NTIS (copy)

Key Categories: COLORADO, CLIMATE

Access Code: 011 Use Code: 02

This is a quarterly technical progress report on the BX in situ oil shale project. Appendix B to this report summarizes the first meteorological data collected from a mechanical weather station located at the ridge site along Black Sulphur Gulch from late June through August 31, 1978. The report presents a map showing the location of the station, discusses monitoring equipment and its installation, operation an maintenance and tabulates monthly wind speeds, directions and temperatures and presents a wind rose.

ABSTRACT

Accession Number:
@ 326
Dregne, H.E., 1975, Salinity aspects of the Colorado River Agreement: in Natural Resources Journal, Univ. of New Mexico, School of Law, Albuquerque. 15, p. 43.

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, SALINITY

Access Code: 000 Use Code: 03

no 327 or 328

ABSTRACT

Accession Number:
@ 329
Eakin, T.E., Price, D., and Harrill, J.R., 1976, Summary appraisals of the nation's groundwater resources - Great Basin Region: U.S. Geological Survey Professional Paper 813-G.

Contact: Public Inquiries Office (copy)

Key Categories: UTAH, WYOMING, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, PRESENT WATER USE

Access Code: 002 Use Code: 03

Ground-water withdrawals by wells in the Great Basin Region were about 1.1 million acre-feet (1,360 cubic hectometres) in 1970. Most of these withdrawals were from 87 of the 234 hydrographic areas in the region. Withdrawals ranged from about 1,000 acre-feet (1.2 cubic hectometres) to more than 100,000 acre-feet (123 cubic hectometres). Jordan Valley, which includes Salt Lake City, had the largest withdrawal, about 115,000 acre-feet (142 cubic hectometres).

An appraisal of the regional ground-water resource indicates the region could sustain an annual net pumpage of about 2.6 million acre-feet (3,200 cubic hectometres). Larger withdrawals could be sustained if only part of the pumped water was used consumptively, if conflicts with existing surface-water rights are resolved, and if extensive treatment, artificial recharge, and reuse of water prove feasible. Ground water stored in the upper 100 feet (30 metres) of saturated deposits of the valley ground-water reservoirs is estimated to be on the order of 300 million acre-feet (370,000 cubic hectometres). Total ground-water storage probably exceeds several billion acre-feet; however, much of this could not be developed within economic feasibility expected over the next several decades.

Only a few areas of the Great Basin Region have been studied in detail sufficient to enable adequate design of an areawide ground-water development. These areas already have been developed. As of 1973 data for broadly outlining the ground-water resources of the region had been obtained. However, if large-scale planned development is to become a reality, a program for obtaining adequate hydrologic and related data would be a prerequisite. Ideally, the data should be obtained in time to be available for the successively more intensive levels of planning required to implement developments.

✓ 1035

ABSTRACT

Accession Number:
@ 329.1
Earnest, H.W., Heisler, R.A., Hoe, H.L., and Rajaram, V., May 1978, Underground disposal of retorted oil shale for the Paraho retorting process: Open-File Report, July 1976 - May 1978, Rep. PB-80-128739, 379 p.

Contact: NTIS (copy)

Key Categories: SURFACE, RECLAMATION, BIBLIOGRAPHY

Access Code: 011 Use Code: 02

This report covers the results of a two-phase study to determine the feasibility of underground disposal of retorted oil shale. Two mining methods, chamber and pillar mining and sublevel stoping, were specified for backfilling. Phase I of the study covered the evaluation of hydraulic, mechanical, and pneumatic transport and stowing systems, individually and in various combinations, and the selection of the most feasible methods. Conveyor transport and stowing and a combination conveyor transport and stowing with pneumatic topfilling were selected for detailed study of phase II. Phase II activities included detailed engineering analysis and design of the selected systems, an engineering economic analysis, and a cost comparison with total surface disposal of retorted oil shale. An extensive literature search was conducted and the bibliography is included in the report.

1036

ABSTRACT

Accession Number:
@ 329.2
Ecker, R.M., Walters, W.H., and Skaggs, R.L., Oct. 1979, Hydrologic monitoring program, Rifle oil shale facility site, Colorado,: Battelle Pacific Northwest Rep. PNL-3220, 62 p.

Contact: NTIS (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 02

A hydrologic monitoring and assessment program is being developed to investigate the hydrologic characteristics of surface and ground waters in the region of the Anvil Points, Colorado, Rifle Oil Shale Facility. The objectives of the program are to: evaluate ground-water contributions to study streams; assess contaminant transport capability of surface and ground waters; determine peak discharge magnitude and frequency relationships for use in designing possible spent oil shale disposal works; and assess the impact of specified hypothetical problems, events, or scenarios. To accomplish these objectives, seven major tasks have been identified: (1) literature review of existing studies dealing with the regional, hydrological, physiographical, geological, and climatological characteristics; (2) ground-water characterization; (3) drainage basin characteristics and channel geometry; (4) streamflow and sediment transport; (5) stream travel times; (6) analysis of spent shale disposal; and (7) support of water quality sample collection.

✓ 1037

ABSTRACT

Accession Number:
@ 329.3
Eckstein, L., Northrop, G., and Scott, R., Feb. 1980, Criteria for the development and use of the methodology for environmentally acceptable fossil energy site evaluation and selection: v. 2, final report: Rep. COO-4574-1, 289 p.

Contact: NTIS (copy)

Key Categories: ENVIRONMENTAL, COLORADO, WYOMING, UTAH

Access Code: 002 Use Code: 02

This report serves as a companion document to the report, Volume 1:Environmentally-Acceptable Fossil Energy Site Evaluation and Selection: Methodology and Users Guide, in which a methodology was developed which allows the siting of fossil fuel conversion facilities in areas with the least environmental impact. The methodology, known as SELECS (Site Evaluation for Energy Conversion Systems) does not replace a site specific environmental assessment, or an environmental impact statement (EIS), but does enhance the value of an EIS by thinning down the number of options to a manageable level, by doing this in an objective, open and selective manner, and by providing preliminary assessment and procedures which can be utilized during the research and writing of the actual impact statement.

1038

ABSTRACT

Accession Number:
@ 329.4
Ege, J.R., Leavesley, G.H., Steele, S.G., and Weeks, J.B., 1978, Site evaluation for U.S. Bureau of Mines experimental oil-shale mine, Piceance Creek basin, Rio Blanco County, Colorado: U.S. Geological Survey Open-File Rep. 78-390, 42 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 002 Use Code: 03

The U.S. Geological Survey is cooperating with the U.S. Bureau of Mines in the selection of a site for a shaft and experimental mine to be constructed in the Piceance Creek basin, Rio Blanco County, Colo.

Four sites are presented for consideration and evaluated on geology and hydrology with respect to shale-oil economics. Evaluated criteria include: (1) stratigraphy, (2) size of site, (3) oil-shale yield, (4) representative quantities of the saline minerals dawsonite and nahcolite, which must be present with a minimum amount of halite, (5) thickness of a "leached" saline zone, (6) geologic structure, (7) engineering characteristics of rock, (8) representative surface and ground-water conditions, with emphasis on waste disposal and dewatering, and (9) environmental considerations.

Serious construction and support problems are anticipated in sinking a deep shaft in the Piceance Creek basin. The two major concerns will be dealing with incompetent rock and large inflow of saline ground water, particularly in the leached zone. Engineering support problems will include stabilizing and hardening the rock from which a certain amount of ground water has been removed.

The relative suitability of the four potential oil-shale experimental shaft sites in the Piceance Creek basin has been considered on the basis of all available geologic, hydrologic, and engineering data; site 2 is preferred to sites 1, 3, and 4.

Water produced during construction of a mine shaft at any of the four proposed sites cannot be released to the surface-water drainage system without degradation of the existing surface-water quality. Consequently, waste water will have to be contained and evaporated if surface-water quality is not to be degraded. Based on hydrologic considerations, site 2 is preferable to sites 1, 3, or 4 if waste material and water are disposed of in Yellow Creek drainage. Water produced during construction at site 2 will be of better quality and smaller quantity than at the other sites. If waste water and rock are disposed of in the unnamed tributary to Yellow Creek, north of site 2, the potential impact of the mine will be minimized. Care needs to be taken to prevent the discharge of waste water and other contaminants to Ryan Gulch and Piceance Creek.

ABSTRACT

Accession Number:
@ 330
Ege, J.R., Carroll, R.D., and Welder, F.A., March 1967, Preliminary report on the geology, geophysics and hydrology of USBM/AEC Colorado core hole No. 2, Piceance Creek Basin, Rio Blanco County, Colorado: U.S. Geological Survey Open-File Report TEI-870, 51 p., plus plates.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 02

Approximately 1,400 feet of continuous core was taken between 800-2,214 feet in depth from USBM/AEC Colorado core hole No. 2. The drill site is located in the Piceance Creek basin, Rio Blanco County, Colorado. From ground surface the drill hole penetrated 1,120 feet of the Evacuation Creek Member and 1,094 feet of oil shale in the Parachute Creek Member of the Green River Formation. Oil shale yielding more than 20 gallons per ton occurs between 1,260-2,214 feet in depth. A gas explosion near the bottom of the hole resulted in abandonment of the exploratory hole which was still in oil shale. The top of the nahcolite zone is at 1,693 feet. Below this depth the core contains common to abundant amounts of sodium bicarbonate salt intermixed with oil shale. The core is divided into seven structural zones that reflect changes in joint intensity, core loss and broken core due to natural causes. The zone of poor core recovery is in the interval between 1,300-1,450 feet.

This report presents a preliminary evaluation of core examination, geophysical log interpretation and hydrological tests from the USBM/AEC Colorado core hole No. 2. The geology section discusses the lithology of the core and its structural and engineering properties. The geophysics section evaluates resistivity and radiation logs and presents determinations of oil yields. The hydrology section discusses the conduct and interpretation of pumping tests using packers, deep-well current meter surveys, and water quality surveys. The detailed water quality and water level data from the pump tests are summarized in several tables and figures.

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ABSTRACT

Accession Number:
@ 330.1
Eggleston, K.O., Hendrick, J.D., Cristofano, E.A., and Gibbs, A.E., April 1974, Systems simulation as a tool for water resource planning, including qualitative aspects: in The use of computer techniques and automation for water resources systems, v.II, Washington, D.C. p. 95-99.

Contact: none

Key Categories: COLORADO, UTAH, WYOMING, COMPUTER MODELS

Access Code: 002 Use Code: 02

In the Colorado River, additional water utilization features are being constructed which will allow the total flow of the river to be diverted for usage. The increasing diversions and consumptive uses are increasing the natural salinity levels. To analyze this problem and to assist in planning salinity alleviation measures, a basin simulation model has been developed. This article discusses the model in terms of general capability and operation, relationships with basin features, hydrological relationships, and salinity routing. This approach allows the operator to interact with the system and utilize high experience and intuition, thereby solving efficiently complex problems pertaining to river basins.

1040

ABSTRACT

Accession Number:
@ 330.2
El-Ashry, M.T., Jan.-Feb. 1980, Groundwater salinity problems related to irrigation in the Colorado River basin: Ground Water, v. 18, no. 1, p. 37-45.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, SALINITY

Access Code: 002 Use Code: 02

The groundwater system in many of the irrigated areas of the Colorado River basin is derived almost entirely from deep percolation of irrigation water and seepage from irrigation conveyance and tailwater collection systems. Salt pickup rates from irrigated soils in the basin vary in the different areas. Among the high salt pickup areas is the Grand Valley in western Colorado, estimated at 8 tons/acre/year. Water entering the groundwater supply from irrigation practices in the valley amounts to about 145,000 acre-feet/year and contributes about 690,000 tons/year to the salt load of the Colorado River. Samples of base-flow water from the weathered mancos shale aquifer in the valley vary in salinity from about 1,500 to about 9,000 mg/l with a mean of 4,100 mg/l; while water samples from alluvial aquifers range from 305 to 124,000 mg/l with a mean of about 11,500 mg/l. Base-flow returning to the river in the drains and washes has concentrations that average about 4,200 mg/l. Water losses and quantitites of irrigation return flows can be reduced by improving farm irrigation efficiencies and by partial or complete lining of canals, laterals, and ditches. Increasing on-farm irrigation efficiency through system improvements and irrigation scheduling is the most cost-effective measure. However, achievement of higher efficiences will require changes in water laws to encourage conservation and revised water pricing policies that discourage waste.

1041

ABSTRACT

Accession Number:
@ 330.3
Elmore, T.L., and Dahl, G.E., Jan. 1980, Erosion and runoff control in northwestern Colorado: in National conference on urban erosion and sediment control: institutions and technology, Oct. 10-12, 1979, St. Paul, MN, U.S. EPA Rep. EPA-905/9-80-002, p. 291-300.

Contact: NTIS (copy)

Key Categories: COLORADO, SEDIMENT, FLOODS, ENVIRONMENTAL

Access Code: 002 Use Code: 02

The Northwest Colorado Council of Governments (NWCCOG) include six counties in the mountainous area of Colorado west of Denver. The combined effect of tourism and the energy industry have created strong development pressures in the region. The scarcity of land is forcing development into stream environment zones, eliminating wetlands, and creating flood hazards. In 1975, NWCCOG received planning agency designation under section 208 of the Clean Water Act. The challenge for this program was to develop a system of controls which would protect existing high water quality, established uniform controls, minimize new regulatory obstacles for developers, and minimize new staff requirements for small local governments. The key to the regulatory program is tying together existing regulatory programs to effectively deal with the problem. These programs include subdivision and land use codes, floodplain regulations, Clean Water Act point source permits, and Clean Water Act dredge and fill permits. Developers are alerted early in the planning stages to potential requirements under this regulator program, so that project siting can be arranged to eliminate onerous requirements, or to make compliance less complicated. The NWCCOG Water Quality Plan outlines policies and guidelines for: surface and groundwater encroachment; vegetation disturbance; soil disturbance and earth movement; impervious cover; and storm water.

ABSTRACT

Accession Number:
@ 331
Ely, N., July 1967, The oil shale industry's water problems: in
Quarterly of the Colorado School of Mines, v. 62, no. 3, p. 575-583.

Contact: Colorado School of Mines (copy)

Key Categories: COLORADO, PROCESS WATER USE, SURFACE, WATER LAW

Access Code: 011 Use Code: 03

This papers briefly summarizes the views that were prevalent in the 1960s on water requirements for oil shale development, water availability, and water quality problems. The paper presents some estimates of water required for production and associated infrastructure, and it discusses such potential environmental problems as radioactivity from rubblization with nuclear devices and water contamination from direct discharge of effluents to the river system. The author overviews the three pieces of legislation that limit water availability in the Upper Basin States--the Colorado River Compact, the Mexican Water Treaty, and the Upper Colorado River Basin Compact.

ABSTRACT

Accession Number:
@ 332
U.S. Dept. of Energy, April 1981, Oil shales and tar sands, a bibliography, Rep. DOE/TIC-3367 (Suppl. 1), 679 p. plus appendices.

Contact: U.S. Government Prinitng Office (copy)

Key Categories: BIBLIOGRAPHY

Access Code: 011 Use Code: 02

To aid those individuals and organizations involved in oil shale and tar sand processing and utilization research, the Department of Energy's Technical Information Center has catalogued, indexed, and stored in machine-readable form a significant protion of the scientific and technical information on oil shales and tar sands published since the 1920s.

This bibliography includes 5142 citations of foreign and domestic research reports, journal articles, patents, conference proceedings, and books. These citations, the 5049 citations published in TID-3367, Oil Shales and Tar Sands, A Bibliography, and those being added to the Energy Data Base on a continuing basis can be recalled and searched using the on-line computer retrieval system, DOE/RECON, or commercial search services. Current citations being added are announced monthly in the publications Fossil Energy Update and Synthetic Fuels Update.

✓ 1042

ABSTRACT

Accession Number:
@ 332.1
U.S. Dept. of Energy, Sept. 1980, Draft programmatic environmental impact statement, development policy options, Naval oil shale reserves, Garfield County, Colorado: Rep. DOE/EIS-0068.

Contact: NTIS (copy)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 02

This programmatic statement deals with several levels of potential decisions which can lead to DOE action to develop the oil shale resources of its 35,000-acre Naval Oil Shale Reserves in Northwest Colorado. It compares the environmental impacts from the range of potential production from this Reserve (50 to 200 thousand barrels per day) with impacts from additional development of other liquid fuel options which might have to provide an equivalent amount of shale oil by 1990. These options which might have to provide an equivalent include coal liquefcation, biomass, and increased conservation. Second, this EIS presents an environmental and financial impact analysis relating five generalized development ventures ranging from a low to a high level of government funding and participation. Developing the Naval Oil Shale Reserves in Colorado to commercial-scale production of 50,000 barrels per day is estimated to have the following gross impacts: alteration of 3% of the total Reserve land; annual consumption of 4,624 to 17,500 acre feet of water, depending on process chosen; yearly emissions of 361 tons of SO_a, 3,641 tons of No_x, 656 tons of CO, 951 tons of particulate, 262 tons of MC; and increasing the area population by a total of 7,500 people. A specific project EIS, which would discuss environmental impacts in detail, would precede any development action by DOE.

✓

1043

ABSTRACT

Accession Number:
@ 332.2
U.S. Dept. of Energy, Sept. 1980, Current environmental, health, safety, and socioeconomic research activities related to oil shale: draft, Rep. DOE/RA/50211-T1, 37 p.

Contact: NTIS (copy)

Key Categories: BIBLIOGRAPHY

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 333
U.S. Dept. of Energy, June 1980, Paraho environmental data:
Rep. DOE/EV-0086, 352 p.

Contact: Jerry Goldstein (copy)

Key Categories: SURFACE WATER QUALITY, GROUNDWATER QUALITY, LEACHING, SURFACE, EFFLUENTS

Access Code: 011

Use Code: 01

From 1973 to 1978, Development Engineering, Inc. (DEI), a subsidiary of Paraho Development Corporation, demonstrated the Paraho technology for surface oil shale retorting at Anvil Points, Colorado. A considerable amount of environmentally-related research was also conducted. This body of data represents the most comprehensive environmental data base relating to surface retorting that is currently available. In order to make this information available, the DOE Office of Environment has undertaken to compile, assemble, and publish this environmental data. The compilation has been prepared by DEI. This report included the process characterization, air quality, and water quality categories.

/ 1044

ABSTRACT

Accession Number:
@ 333.1
U.S. Dept. of Energy, June 1980, Synthetic fuels and the environment, an environmental and regulatory impact analysis: Rep. DOE/EV-0087, 652 p.

Contact: George Rotariu (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL, WATER LAW

Access Code: 002 Use Code: 02

Information is presented under the following section headings: summary; study description; the technologies and their environmental concerns (including, coal liquefaction and gasification, oil shale production, biomass and urban waste conversion); regulatory and institutional analyses; and environmental impacts analysis (including air and water quality analyses, impacts of carbon dioxide and acid rain, water availability, solid and hazardous wastes, coal mining environmental impact, transportation issues, community growth and change, and regional impacts). Additional information is presented in seventeen appendixes.

✓ 1045

ABSTRACT

Accession Number:
@ 333.2
U.S. Dept. of Energy, June 1980, Technology characterizations, environmental information handbook: Rep. DOE/EV-0072, 219 p. plus appendix.

Contact: NTIS (copy)

Key Categories: SURFACE, IN-SITU, EFFLUENTS

Access Code: 011 Use Code: 02

The Environmental Handbook Series is designed to overcome the deficiency of information utility and transfer. Each of the works in this series brings together information in an area and format that is useful to both public and private sector needs. It is meant to serve as a basic reference document that will stand for a period of time and help to enrich decisionmaking and research in the interface of energy and environment. This particular handbook deals with environmental characterization data in a format for use by DOE policy analysts. This treatment includes not only the actual information base, but also a preface which explains the present concept, the historical growth of the program, and the new direction for improved utility. The information base, itself, is constantly being enhanced and is republished periodically as necessary. The specific energy systems for which environmental/technology characterization information is provided are grouped as follows: nuclear energy; coal; petroleum; gas; synthetic fuels; solar energy; geothermal energy; and hydroelectricity.

ABSTRACT

Accession Number:
@ 334
U.S. Dept. of Energy, May 1980, Environmental research on a modified in situ oil shale process - a progress report from the oil shale task force: Rep. DOE/EV-0078, 108 p.

Contact: Bill Chappell (copy)

Key Categories: EFFLUENTS, LEACHING, IN-SITU

Access Code: 011 Use Code: 01

This report summarizes the progress of the US Department of Energy's Oil Shale Task Force in its research program at the Occidental Oil Shale, Inc. facility at Logan Wash, Colorado. More specifically, the Task Force obtained samples from Retort 3E and Retort 6 and submitted these samples to a variety of analyses. The samples collected included: crude oil (Retort 6); light oil (Retort 6); product water (Retort 6); boiler blowdown (Retort 6); makeup water (Retort 6); mine sump water; groundwater; water from Retorts 1 through 5; retort gas (Retort 6); mine air; mine dust; and spent shale core (Retort 3E). The data are presented in three categories: Characterization, Leaching and Health Effects.

✓ 1046

ABSTRACT

Accession Number:
334.1
U.S. Dept. of Energy, May 1980, Processing needs and methodology for wastewaters from the conversion of coal, oil shale and biomass to synfuels: U.S. DOE Rep. DOE/EV-0081.

Contact: Charles Grua (copy)

Key Categories: PROCEEDINGS, EFFLUENTS, IN-SITU, SURFACE

Access Code: 011 Use Code: 01

This report presents the proceedings from the Workshop on Processing Needs and Methodology for Wastewater from the Conversion of Coal, Oil Shale, and Biomass to Synfuels, held at Germantown, Maryland on June 14-15, 1979. The purpose of the workshop was to identify needs to be accomplished by processing technology for these wastewaters and to evaluate the suitability, approximate costs and problems associated with current technology. The report is divided into sections that survey the water usage and effluent situation; identify the probable and possible water-treatment goals anticipated at the time when large-scale plants will be constructed; assess the capabilities, costs and shortcomings of present technology; explore particularly severe environmental-control problems; give overall conclusions from the Workshop and recommendations for future research and study; and finally, present Status Reports of current work from participants in the Workshop. Two of the status reports deal with the characterization and treatment of oil shale wastewaters and are abstracted elsewhere in this bibliography: Fox and Jackson (Abstract No. 372) and Mercer (Abstract No. 580).

✓ 1047

ABSTRACT

Accession Number:
@ 334.2
U.S. Dept. of Energy, Jan. 1980, Environmentally based siting assessment for synthetic-liquid-fuels facilities, final report: Rep. DOE/EV-10287, draft, 507 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 335
U.S. Dept. of Energy, Jan. 1980, Oil shales - selected bibliography
of DOE-sponsored research: Rep. DOE/TIC-3378.

Contact: U.S. Government Printing Office (copy)

Key Categories: BIBLIOGRAPHY

Access Code: 000 Use Code: 02

✓

1048

ABSTRACT

Accession Number:
@ 335.1
U.S. Dept. of Energy, Nov. 1979, Environmental development plan: oil shale: Rep. DOE/EDP-0051, 83 p.

Contact: NTIS (copy)

Key Categories: ENVIRONMENTAL, COLORADO, UTAH, WYOMING

Access Code: 011

Use Code: 03

The present DOE program includes shale oil production research on true in situ methods, modified in situ methods, aboveground methods, and advanced processing technology: gas production research targeted to both eastern and western oil shales; and supporting research for oil shale processing and control technology. DOE policy is that surface retorting is, technologically speaking, ready for commercialization. However, an assessment of information available to date on all methods has identified specific uncertainties and concerns that have implications for the future environmental acceptability of commercial development. These concerns are associated with air quality, water resources and quality, land disturbance, ecological effects, human health, occupational health and safety, transport and end use, socioeconomic, and compliance.

ABSTRACT

Accession Number:
@ 336
U.S. Dept. of Energy, Oct. 1979, Environmental control costs for oil shale processes: Rep. DOE/EV-0055.

Contact: George Rotariu (copy)

Key Categories: SURFACE, IN-SITU, EFFLUENTS, RECLAMATION

Access Code: 011 Use Code: 01

The studies reported herein are intended to provide more certainty regarding estimates of the cost of controlling environmental residuals from oil shale technologies being readied for commercial application. Four commercial oil shale processes were considered. The results in terms of cost per barrel of syncrude oil are predicted to be as follows: Paraho Process, \$0.67-\$1.01; TOSCO II Process, \$1.43-\$1.91; MIS Process, \$2.02-\$3.03; and MIS/Lurgi-Ruhrgas Process, \$1.68-\$2.43. Alternative pollution control equipment and intergrated pollution control strategies were considered and optimal systems selected for each full-scale plant. A detailed inventory of equipment (along with the rationale for selection), effluent and residuals volumes and compositon, a detailed description of control strategies, itemized costs and predicted emission levels are presented for each process. Capital and operating cost data are converted to a cost per barrel basis using detailed economic evaluation procedures. Ranges of cost are determined using a subjective self-assessment of uncertainty approach. An accepted methodology for probability encoding was used, and cost ranges are presented as subjective probability distributions.

√ 1049

ABSTRACT

Accession Number:
@ 336.1
U.S. Dept. of Energy, Oct. 1979, Environmental issues relating to fossil energy technology options: Rep. DOE/EV-0065, 27 p.

Contact: NTIS (copy)

Key Categories: ENVIRONMENTAL, COLORADO, WYOMING, UTAH

Access Code: 011 Use Code: 03

The Office of Fossil Energy has prepared a report on fossil technology options available to reduce oil imports. It identifies energy processes ready for immediate deployment (called first wave) and those that, after further development, would provide sustantial benefits over the first wave. The latter (called second wave) technologies could be in commercial use in the late 1980's. The status of environmental readiness for each of these fossil technologies is addressed in this report. Primary environmental concerns and environmental reserach required concurrent with fossil technology development and commercial operation are described herein and presented in conformance to the organization of the fossil options paper. These are briefly mentioned in this introduction. Further details, specific to each technology, are in the appropriate sections of the report. Research is continuing on both health and ecological effects of coal combustion and gasification. Having identified cancer-producing elements in airborne particulates, the Environmental Protection Agency (EPA) is developing a standard for respirable range particulates. With regard to the synthetic fuels, one of the major concerns is the health and safety aspects of the coal liquid products. It is known, for example, that some coal-derived liquids that have undergone only minimal processing or upgrading do contain carcinogens. Environmental affects in other fossil energy areas such as oil shale processing, enhanced oil recorvery, etc., are discussed.

ABSTRACT

Accession Number:
@ 337
U.S. Dept. of Energy, Sept. 1979, Proceedings of the U.S. Dept. of Energy environmental control symposium: v. 1 of 3. Plenary session and fossil fuels, Rep. DOE/EV-0046, 642 p.

Contact: Charles Grua (copy)

Key Categories: EFFLUENTS, PROCEEDINGS, SURFACE, IN-SITU

Access Code: 011 Use Code: 02

This report, prepared by Laramie Energy Technology Center, presents an environmental impact assessment of the Geokinetics experimental program at its Seep Ridge site. The report includes a discussion of local geology, hydrology, biology, meterology and air quality. It discusses the impact of the proposed program on each of these. It presents characterization data on local perched groundwaters and on Geokinetics' retort water.

1050

ABSTRACT

Accession Number:
@ 337.1
U.S. Dept. of Energy, Jan. 1979, Environmental readiness of emerging energy technologies, summary report: U.S. DOE Rep. DOE/ERD-0022, 73 p.

Contact: NTIS (copy)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 000 Use Code: 03

✓ 1051

ABSTRACT

Accession Number:
@ 337.2
U.S. Dept. of Energy, 1979, Environmental assessment, Geokinetics, Inc., Oil Shale Research Project, Uintah County, Utah: Rep. DOE/LETC/EA-0114, 59 p.

Contact: NTIS (copy)

Key Categories: ENVIRONMENTAL, IN-SITU, UTAH, EFFLUENTS, GROUNDWATER QUALITY

Access Code: 011 Use Code: 02

This report, prepared by Laramie Energy Technology Center, presents an environmental impact assessment of the Geokinetics experimental program at its Soap Ridge site. The report includes a discussion of local geology, hydrology, biology, meteorology, and air quality. It discusses the impact of the proposed program on each of these. It presents characterization data on local perched groundwaters and on Geokinetics' retort water.

ABSTRACT

Accession Number:
@ 338
U.S. Dept. of Energy, Sept. 1978, Environmental readiness document: oil shale, commercialization Phase III planning: Rep. DOE/ERD-0016, 37 p.

Contact: NTIS (copy)

Key Categories: ENVIRONMENTAL, COLORADO, WYOMING, UTAH

Access Code: 011 Use Code: 03

The primary unresolved problems that aboveground retorting faces are stringent air quality regulations, management of solid wastes, and lack of data on the environmental, health, and safety impacts. Concerns of in-situ technologies are aquifer disruption/contamination, occupational health underground (modified in situ), lack of data on environmental, health, and safety impacts. Probabilities are computed that an adverse finding will be found, that the program will be delayed, and that energy costs will increase by 10%.

ABSTRACT

Accession Number:
@ 339
U.S. Dept. of Energy, 1977, A bibliography of publications dealing with oil shale and shale oil from U.S. Bureau of Mines, 1917-1974, and the ERDA Laramie Energy Research Center, 1975-1976: Rep. LERC/RI-77/7, 58 p., Sept. 1977.

Contact: U.S. Government Printing Office (copy)

Key Categories: BIBLIOGRAPHY

Access Code: 002 Use Code: 02

Publications listed in this bibliography result from oil-shale research conducted under a continuous train of federal oil-shale programs. The U.S. Bureau of Mines began investigation of shale-oil production during World War I, generating the oil-shale portion of this bibliography's first entry. With passage of the Synthetic Liquid Fuels Act in 1944, two major Bureau of Mines oil-shale research installations were established --production research at the Oil-Shale Demonstration Plant near Rifle, Colorado, and the oil-shale research and testing at the Laramie Petroleum and Oil-Shale Experiment Station in Laramie, Wyoming. Published research reports from both of these stations are cited in this bibliography. With completion of the Synthetic Liquid Fuels Act program in 1956, the Oil-Shale Demonstration Plant was closed. This left the Bureau of Mines Laramie Station, which eventually became the Laramie Energy Technology Center (LETC), as the sole site of federally sponsored oil-shale and shale-oil research although a few peripheral projects were conducted at other Bureau of Mines installations. For a long period LETC was the only western world laboratory conducting continuing research on oil shale and production of energy from it. Oil-shale publications by LETC were the major additions to oil-shale literature thru this period. Recognition of the United States energy dilemma, reawakened interest in oil shale and eventually led to the establishment of the Energy Research and Development Administration (ERDA) and then the Department of Energy (DOE). The Laramie Energy Technology Center is designated as DOE's oil-shale lead laboratory. Field projects and oil-shale laboratory's research continued at LETC although the Center's role broadened. This bibliography lists the oil-shale work at and sponsored by LETC extending the period covered thru 1979.

ABSTRACT

Accession Number:
@ 340
Engelke, M.J., Jr., 1978, The biology of Salt Wells Creek and its tributaries, southwestern Wyoming: U.S. Geological Survey Water-Resources Investigations 78-121, 82 p.

Contact: Public Inquiries Office (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY, SURFACE WATER QUALITY

Access Code: 011 Use Code: 02

A description of biological communities in Salt Wells Creek, a plains stream in the Green River Basin of Wyoming, is presented. The description includes population distribution patterns, community edge effects, the food pyramid, and nutrition (trophic) levels between various types of plants and animals. Both algae and stream invertebrates were studied.

The report also summarizes water quality data and discusses its relationship to stream biology. Monthly graphs of a number of water quality parameters, including dissolved oxygen, discharge and suspended sediment, specific conductance, Ca, Mg, Na, N, and P, are presented for Gap Creek and Salt Wells Creek for water year 1976. Other water quality parameters are summarized in tables.

ABSTRACT

Accession Number:
@ 342
U.S. Environmental Protection Agency, Oct. 1980, Water quality trends in region VIII, 1979 data: Rep. EPA-908/2-80-001, 140 p.

Contact: NTIS (copy)

Key Categories: COLORADO, UTAH, WYOMING, SURFACE WATER QUALITY

Access Code: 000 Use Code: 02

no 341

✓ 1052

ABSTRACT

Accession Number:
@ 342.1
U.S. Environmental Protection Agency, 1980, Oil shale symposium sampling, analysis and quality assurance: Rep. EPA-600/9-80-022.

Contact: Ed Bates (copy)

Key Categories: PROCEEDING

Access Code: 000 Use Code: 01

✓ 1053

ABSTRACT

Accession Number:
@ 342.2
U.S. Environmental Protection Agency, 1978, A compendium of lake and reservoir data compiled by the National Eutrophication survey in the Western United States: Working paper no. 477, Corvallis Environmental Research Laboratory, Oregon, PA., 168 p.

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

Morphometric, limnological, and nutrient loading data collected in 1975 during EPA's national euthophication survey are summarized for 136 lakes and reservoirs in the Rocky Mountain and far-western states. A brief introduction describes data collection methodology. Data are arranged in five categories for each body of water: (1) morphometry, (2) physical and chemical characteristics, (3) biological characteristics, (4) nutrient loading, and (5) nonpoint source nutrient export. A trophic level designation is also given.

ABSTRACT

Accession Number:
@ 343
U.S. Environmental Protection Agency, Sept. 1980, Assessment of energy resource development impact on water quality, the Yampa and White River Basins: Melancon, S.M., (Univ. of Nevada) and Hess, B.C., and Thomas, R.W., (Environmental Monitoring Systems Lab, Las Vegas, NV), EPA-600/7-80-151.

Contact: BLM - Craig (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 102 Use Code: 02

This report is part of a multiagency study involving the U.S. Environmental Protection Agency (EPA), U.S. Geological Survey (USGS), National Oceanic and Atmospheric Administration (NOAA), and the National Aeronautics and Space Administration (NASA) under various interagency agreements. The primary objective of this study is to evaluate the existing water quality monitoring network in the Yampa and White River Basins of Utah, Wyoming, and Colorado and to recommend needed modifications to the present sampling program design.

As a basis for monitoring strategies recommended in this report, present and planned energy developments are defined, and available baseline data on the Basins are examined. For assessment of these monitoring strategies, the impact of ongoing and anticipated energy development on both water quality and quantity in the western energy basins is considered. Future documents will present more detailed analyses of potential impacts from various energy technologies, sampling methodologies and frequency requirements, and site alternatives in light of updated information regarding water right allocations.

1054

ABSTRACT

Accession Number:
@ 343.1
U.S. Environmental Protection Agency, Oct. 1979, Water and air quality trends in region VIII, 1978 data: Rep. EPA-908/2-79-001, 215 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

Water quality trends and status for the calendar year 1979 were determined for the six states in Region VIII. These states include Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming. Data resident in the EPA national data bank (STORET) were analyzed.

Statistical tests which detect significant differences between two populations were utilized to show trends in water quality. The status and severity of stream pollutants were determined by comparing observed parameter concentrations to state Water Quality Standards or recognized criteria.

1055

ABSTRACT

Accession Number:
@ 343.2
U.S. Environmental Protection Agency, Oct. 1977, Energy from the West: a progress report of a technology assessment of Western energy resource development: executive summary, Rep. EPA-600/9-77-032, 12 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 02

Impacts associated with three levels of western United States energy resource development (nominal, low demand, and low nuclear availability for 1980, 1990, and 2000) were assessed. Energy development scenarios within the eight state area (Montana, North Dakota, South Dakota, Wyoming, Utah, Colorado, Arizona, and New Mexico) at six sites examined five development alternatives: surface and underground mining of coal; conversion and exportation of coal; surface retorting of oil shale; milling of uranium ore; conventional crude oil and natural gas production. Transportation by rail, pipeline, and extra high voltage transmission lines were combined with energy development technologies, both state-of-the-art and projected.

Site-specific and regional impacts were identified and analyzed in terms of: air quality; water availability and quality; social, economic, political, and ecological impacts; and regional health effects, transportation, noise and aesthetics. Policy implications are discussed in terms of required energy resource development planning, cooperation between energy developers and local governments, and improved environmental and ecological controls.

ABSTRACT

Accession Number:
@ 344
U.S. Environmental Protection Agency, 1976, Oil shale bibliography:
STRI and TRW.

Contact: none

Key Categories: BIBLIOGRAPHY

Access Code: 000 Use Code: 03

1056

ABSTRACT

Accession Number:
@ 344.1
U.S. Environmental Protection Agency, June 1975, Accomplishment plan, Region VIII, comprehensive energy-environment program: appendix, 73 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 03

This report is an appendix to a foregoing study on the minimization of environmental damage while developing energy resources in Region VIII. It contains charts of the organization structure of the office of energy activities for Region VIII and the 208 planning areas in the region, including maps of the designated areas. Surface water quality monitoring programs for oil shale and coal resource areas are limited with data on field measurements, chemical, biological and physical parameters, nutrients, metals, organic carbons, and oxygen demand; and maps showing the monitoring programs in the energy resource areas. Maps and tables present locations of, and data on, groundwater and air quality monitoring stations in the region. A section on contracts summary presents the contract, amount funded, description of the contract, and present status of the contract for FY1975. The final section describes the energy resources in Region VIII. The amount and the productive capacity of the region compared to the rest of the nation.

1057

ABSTRACT

Accession Number:
@ 344.2
U.S. Environmental Protection Agency, 1974, Water quality standards - Colorado River system salinity control policy and standards procedure: in Federal Register, p. 43721-43723.

Contact: any public library (copy)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, WATER LAW

Access Code: 002 Use Code: 02

This notice sets forth a policy of maintaining salinity concentrations in the Colorado River system at or below 1972 average levels. It also requires the Colorado River system average levels states to promulgate standards and a plan for meeting the standards. The first step will be the establishment of procedures within thirty days of the effective date of these regulations for the adoption on or before October 18, 1975, of water quality standards for salinity including numerical criteria and an implementation plan for salinity control. The goal of the plan shall be to achieve compliance with the adopted standards by July 1, 1983. Comments and suggestions of interested parties are summarized.

ABSTRACT

Accession Number:
@ 345
U.S. Environmental Protection Agency, 1972, The Meeker Well and other phenomena in the vicinity of the Meeker Dome, Rio Blanco County, Colorado - a summary report on the feasibility of control of seepage of saline water: Technical Support Branch, Surveillance Analysis Division, EPA Region VIII, 40 p.

Contact: NTIS (copy)

Key Categories: COLORADO, GROUNDWATER QUANTITY, EFFLUENTS

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 346
U.S. Environmental Protection Agency, 1971, The mineral quality problem in the Colorado River basin: appendix A: natural and man-made conditions affecting mineral quality, appendix B: physical and economic aspects, appendix C: salinity control and management aspects, appendix D: comments on draft report, summary report, Washington, D.C.

Contact: U.S. Government Printing Office (copy)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY

Access Code: 002 Use Code: 02

The Colorado River Basin Water Quality Control Project was established as a result of recommendations made at the first session of a joint federal-state "Conference in the Matter of Pollution of the Interstate Waters of the Colorado River and its Tributaries" held in 1960. This project serves as the technical arm of the conference and provides the conferees with pollution problems and their effects on water users, and recommended measures for control of pollution in the Colorado River basin. In 1963, the Colorado River Basin Water Quality Control Project began detailed studies of the mineral quality problem in the Colorado River basin. The more significant findings and data from the project's salinity studies are summarized. Detailed information pertaining to the methodology and findings of the project's salinity studies are summarized. Detailed information pertaining to the methodology and findings of he project's salinity studies are presented in three appendices--Appendix A, "National and Man-Made Conditions Affecting Mineral Quality", Appendix B, "Physical and Economic Impacts," and Appendix C, "Salinity Control and Management Aspects."

Appendix A includes a discussion of the factors which affect mineral quality in streams, a description of the statistical methods utilized in the analysis of existing water quality data and a summary of the findings, a description of the methods employed in the field studies, and a summary of the findings regarding sources of mineral salts within the Colorado River Basin.

As a part of it overall study of the salinity problem, the Colorado River Basin Water Quality Control Project carried out detailed studies to evaluate the physical and economic impacts associated with anticipated degradation in the mineral quality of Colorado River water. The methods of investigation and the results of these studies are presented in Appendix B.

Finally, Appendix C can be considered an interim summary of the "state of the art" with respect to salinity control and Management for the Colorado River Basin.

ABSTRACT

Accession Number:
@ 347
Equity Oil Co., series, Baseline monitoring report for BX site: monthly and quarterly progress reports submitted to Equity Oil Co. by VTN Consolidated.

Contact: Paul Dougan (access)

Key Categories: SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 02

The Equity Oil Company is constructing the BX oil shale project to investigate the feasibility of using superheated steam for in-situ retorting of oil shale. Their site is along Black Sulphur Gulch in the Piceance Basin, about 45 miles northeast of Meeker, Colorado. A baseline monitoring program is being conducted at this site to determine existing surface and groundwater quality and quantity and to detect development impacts. Surface water quality and flow are measured at two stations along Black Sulphur Creek, above and below the project site. Weekly measurements are made of flow, temperature, specific conductance, pH, dissolved oxygen, and turbidity. Samples are taken monthly for detailed water quality analyses which include solids, SO_4, F, B, Ca, NH_3, and others. Four shallow wells also are monitored for water level and water quality. This monitoring program is described in greater detail in Jacobs, 1979 (Abstract No. 491) and the results of monitoring are submitted monthly and quarterly to Equity Oil Company.

ABSTRACT

Accession Number:
@ 348
Equity Oil Company, June 1979, BX in situ oil shale project:
quarterly technical progress report, March 1-May 31, 1979,
Rep. FE-1747-8, 83p.

Contact: none

Key Categories: COLORADO, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 02

This is a quarterly progress report for the Equity BX project in Colorado. Appendix I to this report presents a summary of on-site air and water monitoring programs. Appendix A presents the results of a field study to determine the geohydrologic properties of the leached zone. This latter report presents the results of a pump test and an analysis of groundwater movement.

ABSTRACT

Accession Number:
@ 349
Evangelow, V.P., March 1981, Chemical and mineralogical composition and behavior of the Mancos shale as a diffuse source of salts in the Upper Colorado River basin: Ph.D. Dissertation, 198 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY

Access Code: 002 Use Code: 02

Previous investigations relative to salinity in the upper Colorado River basin have mostly dealt with the total quantities of dissolved solids moving into the Colorado River. Soluble components resulting from dissolution of mineral species have been studied as separate physical entities in the Colorado River, in tributuaries of the river and in the Mancos shale formation. Thus, the Mancos shale itself has been treated basically as an inert material without consideration of possible interactions between soluble and insoluble phases. The purpose of this investigation is to conduct a thorough study of mineralogical and chemical characteristics of Mancos shale within the West Salt Creek Watershed, Colorado. The investigation focuses on the Mancos shale as a source of soluble components contributing to salinity of the Colorado River including interactive relationships between the more soluble and less soluble mineral phases. The overall investigation has revealed the primary source of salts. Salts are derived from carbonates, calcite and dolomite, which upon contact with sulfuric acid (produced by the biological oxidation of pyrite), produce gypsum and magensium sulfates. A second source is gypsum as a product of the marine environment left after evaporation had occured. A third source is the continuous release of ions from such sources as dolomite, feldspars and micas. A fourth source is the leaching of ions of sodium and magnesium coming off the exchange complex of the unweathered Mancos shale formation.

ABSTRACT

Accession Number:
@ 350
Evans, N.A., 1973, Regional energy-water problems-Colorado River-Great basin: in The role of water in the energy crisis, Proceedings of a conference at Lincoln Nebraska Oct. 23-24, 1973, Nebraska Water Resources Research Institute publication, p. 192-194.

Contact: N.A. Evans (copy)

Key Categories: COLORADO, UTAH, AVAILABLE WATER BY BASIN, SURFACE, PROCESS WATER USE

Access Code: 002 Use Code: 03

A large portion of the nation's uramium deposits are contained within the Colorado River basin. Geothermal resources are know but not fully inventoried. It is thought that most of this energy is associated with saline waters which present disposal problems. Power generation by coal requires around 15 acre-feet per megawatt, with 30,000 MW coal generation expected by 1990, the water demand in the basin for this purpose will be 450,000 acre-feet per year. This amount of water is available within the various state allocations from the Colorado River. An oil shale operation producing one million barrels per day will require 120,000 acre-feet of water per year. To that requirement must be added approximately 4,000 acre-feet per year which will be required to sustain vegetation on reclaimed land and shale residue. This amount of water is expected to be available from that reserved by the federal government, although claimed federal rights are in dispute. Nuclear stimulation of natural gas reservoirs has a very small water requirement. The impact of this potential energy source on water supplies can be considered nil. In general, state policies on energy resource development are lacking. The intermingled land ownership created multi-jurisdictional problems because energy resources do not follow jurisdictional boundaries. The issue is how to obtain harmony in land use regulation. Environmental guidelines are needed which will protect the land and water resources.

1058

ABSTRACT

Accession Number:
@ 350.1
Everhart, W.H., and May, B.E., Feb. 1973, Effects of chemical variations in aquatic environments: v. I, Biota and chemistry of Piceance Creek, Colorado State University, Fort Collins, Colorado, Ecological Research Series, Dept. of Fishery and Wildlife Biology, Rep. PB-221343/7, 126 p.

Contact: U.S. Government Printing Office (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 011 Use Code: 02

The Piceance Creek study was undertaken to obtain information about physical, chemical, and biological parameters of a small stream in northwestern Colorado. Oil shale, abundant in this area, will likely be mined and processed in the future. Pollution from this exploitation could alter aquatic habitats in the Piceance basin, in the White River, and in the Colorado River. Sampling a small stream in the rich oil shale country in northwestern Colorado confirmed distinct seasonal trends and habitat preference in invertebrate populations. Discharge was a major influence on invertebrates and chemical compositions of the stream. Seasonal variations, biomass, and species composition of invertebrates appear characteristic of oil shale area streams.

1059

ABSTRACT

Accession Number:
@ 350.2
Eychaner, J.H., 1976, Estimating runoff volumes and flood hydrographs in the Colorado River basin: southern Utah, Water-Resources Investigations 76-102, 18 p.

Contact: Public Inquiries Office (copy)

Key Categories: UTAH, FLOODS, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 01

Hydrographs of 364 floods from 18 continuous-record gaging sites in the Colorado River basin in southern Utah were used to define a single relation of flood volume to peak discharge; the standard error of estimate of that relation is 82 percent. Using the same data, a mean dimensionless hydrograph was prepared. Synthetic hydrographs may be derived for basins of 5 to 300 square miles (13 to 780 square kilometers) and flood peaks of 1 to 7,000 cubic feet per second (0.03 to 200 cubic meters per second) using that mean dimensionless hydrograph. Design flood peaks may be estimated from other reports. A method is presented to estimate the reduction in culvert or bridge size resulting from use of storage above the structure. Reduction of structure capacity of 25 percent may be achieved by storing 4 percent of the total flood volume.

ABSTRACT

Accession Number:
@ 351
Eychaner, J.H., and others, 1975, Ground-water conditions in Utah, spring of 1975: Utah Dept. of Natural Resources, Cooperative-Investigations Report No. 14, 64 p.

Contact: Utah Division of Water Resources (copy)
USGS - Salt Lake City (copy)

Key Categories: GROUNDWATER QUANTITY, UTAH

Access Code: 011 Use Code: 03

This is the twelfth in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow.

The report includes individual discussions of the most important areas of groundwater withdrawals in the State for the calendar year 1974. Water-level fluctuations, however, are described for the period spring 1974 to spring 1975.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-74. Other information that encompasses the study area is combined with data from other parts of the State.

✓ 1060

ABSTRACT

Accession Number:
@ 351.1
Farmer, E.E., and Fletcher, J.E., Dec. 1971, Precipitation characteristics of summer storms at high elevation stations in Utah: USDA Forest Service Res. paper INT-110, 24 p.

Contact: none

Key Categories: UTAH, CLIMATE

Access Code: 002 Use Code: 02

Results of data analyses are presented for 25 precipitation intensity stations on two study areas in central and north-central Utah located at elevations between 4,350 and 10.150 feet MSL. All data were collected during the period May 1 to October 31. Each station has 10 or more years of record; one station has 30 years of record. The following analyses were made: (1) record consistency (2) definition of local precipitation zones; (3) intensity-duration-frequency characteristics; (4) 24-hour depths; (5) monthly depths and number of storms; (6) storm occurrence by hour of the day; and (7) storm occurrence by storm duration. There is a trend toward reduced intensities with increasing elevation but the trend is not uniform. However, those precipitation zones that receive the most intense rainfall do not coincide with those zones receiving the greatest depth of rainfall. Generally, rainfall depth increases with elevation, but on one study area the zone that received the greatest depth was not the highest elevation zone. A marked difference in the distribution of storm occurence by hour between the two study areas is attributed to differences in storm type and to differences in the principal source of summer moisture. Average storm length varies inversely with elevation.

ABSTRACT

Accession Number:
@ 352

Farrier, D.S., Fox, J.P., and Poulson, R.E., 1979, Interlaboratory, multimethod study of an in situ produced oil shale process water: in Gale, C., ed., Proceedings of the Oil Shale Symposium, sampling, analysis and quality assurance, EPA-600/9-80-022, p. 182. (Also published as Lawrence Berkeley Laboratory Rep. LBL-9002).

Contact: Gloria Gill - LBL (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

The purpose of the present work was to obtain a careful chemical characterization of an oil-shale process water designated for wide use in environmental research and to determine the suitability of existing analytical methods for this characterization. The study was carred out using an interlaboratory, multimethod approach. Samples from a larger volume, homogeneous reserve of an in situ oil-shale process water were prepared and submitted to 13 laboratories for the measurement of major, minor, and trace elements and standard water quality parameter; a variety of instrumental and chemical methods were used. This paper presents the characterization of that water and discusses analytical problems specific to in situ oil-shale process waters.

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1061

ABSTRACT

Accession Number:
@ 352.1
Federal Energy Regulatory Commission, Sept. 1981, Appraisal report,
water resources appraisal for hydroelectric licensing: Yampa River
basin, Colorado, Wyoming: San Francisco Regional Office, San
Francisco, California, Rep. FERC-0086, 45 p.

Contact: NTIS (copy)

Key Categories: Colo. WYOMING, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 02

The water resources of the Yampa River Valley which covers approximately 9530 sq. mi. of northwest Colorado and southcentral Wyoming are evaluated. Data are presented on existing and potential water resource development, on water uses, e.g., for irrigation, municipal water supplies, or in thermal power plan cooling systems, and on the status of hydro plant licensing. Past and current planning studies are summarized. The information presented is current as of September 1981.

✓

1062

ABSTRACT

Accession Number:
@ 352.2
Federal Energy Regulatory Commission, Office of Pipeline and Producer Regulation, 1980, Trailblazer pipeline system, final environmental impact statement: Federal Energy Regulatory Commission Report FERC/EIS-0018, 403 p.

Contact: U.S. Government Printing Office (copy)

Key Categories: WYOMING, ENVIRONMENTAL

Access Code: 011 Use Code: 03

In November 1978, Trailblazer Pipeline Company, Overthrust Pipeline Company and Colorado Interstate Gas Company filed a joint application before the Federal Energy Regulatory Commission to construct and operate an 842.5 mile long pipeline facility to be called the Trailblazer System. This system would transport natural gas from the Overthrust Belt of the Rocky Mountains to markets in the west, midwest and east via connections with other systems.

This final EIS assesses the environmental impact of the proposed project, a modification of the project design, several alternative routings, and the use of existing systems modified as necessary to transport similar volumes of gas. It also assesses the primary impact of nonjurisdictional gas conditioning facilities needed to provide some of the gas necessary for this project. Effects on land use, vegetation, soils, wildlife, water, air quality, noise levels, geology, cultural resources, and socioeconomic conditions are considered.

1063

ABSTRACT

Accession Number:
@ 352.3
Federal Insurance Administration, May 1979, Flood insurance study, Carbon County, Utah, unincorporated area: U.S. Dept. of Housing and Urban Development, 21 p. plus figures.

Contact: Federal Emergency Management Agency (copy)

Key Categories: UTAH, FLOODS

Access Code: 002 Use Code: 02

The Flood Insurance Study covers the unincorporated areas of Carbon County, Utah. The Cities of Helper, Price, Wellington, Sunnyside, East Carbon, Hiawatha, and Scofield were not included in this study.

Floods caused by overflow of the Price River and Cardinal, Meads, Spring Glen, and Spring Canyon Washes were studied by detailed methods. Flooding on several washes and creeks tributary to the Price River was studied by approximate methods.

Those areas studies by detailed methods were chosen with consideration given to all proposed construction and forecasted development through 1982.

1064

ABSTRACT

Accession Number:
@ 352.4
Federal Insurance Administration, Jan. 1979, Flood insurance study, City of Glenwood Springs, Colorado, Garfield County: U.S. Dept. of Housing and Urban Development, 24 p. plus figures.

Contact: Federal Energy Management Agency (copy)

Key Categories: COLORADO, FLOODS

Access Code: 002 Use Code: 02

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the City of Glenwood Springs, Garfield County, Colorado, and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert Glenwood Springs to the regular program of flood insurance by the Federal Insurance Administration. Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

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1065

ABSTRACT

Accession Number:
@ 352.5
Federal Insurance Administration, Jan. 1979, Flood insurance study, city of Rock Springs, Sweetwater County, Wyoming: U.S. Dept. of Housing and Urban Development, 21 p. plus figures.

Contact: Federal Emergency Management Agency (copy)

Key Categories: WYOMING, FLOODS

Access Code: 002 Use Code: 02

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the City of Rock Springs, Sweetwater County, Wyoming, and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert Rock Springs to the regular program of flood insurance by the Federal Insurance Administration. Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1066

ABSTRACT

Accession Number:
@ 352.6
Federal Insurance Administration, Sept. 1978, Flood insurance study, city of Helper, Carbon County, Utah: U.S. Dept. of Housing and Urban Development, 14 p. plus figures.

Contact: Federal Emergency Management Agency (copy)

Key Categories: UTAH, FLOODS

Access Code: 002 Use Code: 02

This Flood Insurance Study covers the incorporated area of the City of Helper, Carbon County, Utah.

Floods caused by overflow of the Price River and Spring Canyon Wash were studied by detailed methods.

Those areas studied by detailed methods were chosen with consideration given to all proposed construction and forecasted development through 1982.

1067

ABSTRACT

Accession Number:
@ 352.7
Federal Insurance Administration, Sept. 1978, Flood insurance study, city of Price, Carbon County, Utah: U.S. Dept. of Housing and Urban Development, 11 p. plus figures.

Contact: Federal Emergency Management Agency (copy)

Key Categories: UTAH, FLOODS

Access Code: 002 Use Code: 02

This Flood Insurance Study covers the incorporated area of the City of Price, Carbon County, Utah. The area of study is shown on the Vicinity Map (Figure 1).

Floods caused by overflow of the Price River and Meads Wash were studied in detail. Flooding on several small drainageways in the city was studied by approximate methods.

Those areas studied by detailed methods were chosen with consideration given to all proposed construction and forecasted development through 1982.

√ 1068

ABSTRACT

Accession Number:
@ 352.8
Federal Insurance Administration, March 1978, Flood insurance study, city of Sunnyside, Utah, Carbon County: U.S. Dept. of Housing and Urban Development, 15 p. plus figures.

Contact: Federal Emergency Management Agency (copy)

Key Categories: UTAH, FLOODS

Access Code: 002 Use Code: 02

This Flood Insurance Study covers the entire incorporated area of the City of Sunnyside, Carbon County, Utah.

Floods caused by overflow of Grassy Trail Creek, downstream from Number Two Canyon, and the Northern Slope Tributary, downstream from Valley View Road, were studied in detail. Flooding on the upstream portions of Grassy Trail Creek and on the floodwater diversion ditch, the smaller tributaries to the Northern Slope Tributary, and Number Two Canyon were studied by approximate methods.

The limits of detailed and approximate study in Sunnyside were determined by the Federal Insurance Administration after consultation with the community and the study contractor. In general, those areas that are currently developed, or are expected to be developed through 1982, were studied by detailed methods; the remaining areas were studied by approximate methods.

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1069

ABSTRACT

Accession Number:
@ 352.9
Federal Insurance Administration, Feb. 1977, Flood insurance study, Garfield County, Colorado, unincorporated areas: U.S. Dept. of Housing and Urban Development, 24 p. plus figures.

Contact: Federal Emergency Management Agency (copy)

Key Categories: COLORADO, FLOODS

Access Code: 002 Use Code: 02

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the unincorporated areas of Garfield County, Colorado, and to aid in the administration of the Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert the unincorporated areas of Garfield County to the regular program of flood insurance by the Federal Insurance Administration. Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

ABSTRACT

Accession Number:
@ 353
Federal Insurance Administration, Feb. 1977, Flood Insurance Study, town of Rangely, Colorado, Rio Blanco County: U.S. Dept. of Housing and Urban Development, 19 p. plus figures.

Contact: Federal Emergency Management Agency (copy)

Key Categories: COLORADO, FLOODS

Access Code: 002 Use Code: 02

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the Town of Rangely, Rio Blanco County, Colorado, and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert Rangely to the regular program of flood insurance by the Federal Insurance Administration. Further use of the report will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1070

ABSTRACT

Accession Number:
@ 353.1
Federal Register, July 6, 1981, Part III, Water Resources Council
Synthetic fuels development for the Upper Colorado Region water assessment: p. 35054-35070.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN, PRESENT WATER USE, PROCESS WATER USE, ENVIRONMENTAL

Access Code: 011 Use Code: 01

This report describes the availability of water to support the production of synfuels through coal and oil shale conversion technologies and discusses major effects that synfuels development could have on the water resources of the Upper Colorado River Region. This report summarizes the full technical report, which is presented in Abstract No. 264.

This report concludes that synfuels development will increase the annual consumptive water use in the Upper Colorado Region by about 150,000 acre-feet per year for each million barrels of oil equivalent production per day. The Region's total water resources are estimated to be able to suport nearly 3 million barrels of oil equivalent synfuels production per day. Water quality impacts are anticipated to be minimal as wastewater will be disposed of through evaporation.

ABSTRACT

Accession Number:
@ 354
Felix, W.D., Farrier, D.S., and Poulson, R.E., 1977, High performance liquid chromatographic characterization of oil shale retort waters: in Proceedings of the Second Pacific Chemical Engineering Congress, v. I, American Institute of Chemical Engineers, New York, New York, p. 480.

Contact: Dave Farrier (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 03

Analytical procedures are required for the rapid, quantitative determination of organic solute alteration in oil shale retort waters which may occur through photolytic, thermal, chemical and microbial action. High performance liquid chromatographic separations of retort water solutes were optimized using selected eluants on 25 cm bonded phase columns. RP8 (reverse phase, long chain hydrocarbon bonded) columns of high theoretical plate capacity (10,000 to 40,000 plates/meter) with programmed gradient elution provided adequate resolution to obtain "fingerprint" spectra against which comparisons may be made of spectra from altered retort waters.

The organic compound content of oil shale waters is expected to be extremely complex, being made up of numerous compounds at high concentrations and almost innumerable compounds at extremely low concentrations. Changes in a few selected components are detected by uv analysis of the HPLC effluent stream may provide a reasonable indication of modifications of one retort water sample with respect to another. While quantitative changes may not be accurately determined, a qualitative indication of the extent of change is possible.

ABSTRACT

Accession Number:
@ 355
Feltis, R.D., 1968, Preliminary assessment of ground water in the Green River Formation, Uinta basin, Utah: U.S. Geological Survey Professional Paper 600-B, p. B200-B204.

Contact: Public Inquiries Office (copy)
USGS - library (loan)

Key Categories: GROUNDWATER QUANTITY, GROUNDWATER QUALITY, UTAH, SPRINGS

Access Code: 011 Use Code: 02

This report briefly discusses well yields and groundwater quality in the Uinta basin. It presents a table of selected analyses of waters collected from 51 oil and gas wells and a single spring.These data are briefly discussed, and the quality of water is related to topographic position and geology of the area.

ABSTRACT

Accession Number:
@ 356
Feltis, R.D., 1966, Water from bedrock in the Colorado Plateau of Utah: Utah State Engineer Technical Publication No. 15, 82 p.

Contact: Utah Division of Water Rights (loan)

Key Categories: GROUNDWATER QUANTITY, GROUNDWATER QUALITY, UTAH

Access Code: 112 Use Code: 02

This report addresses the bedrock aquifers of the Colorado Plateau of Utah. This Plateau comprises about half the area of the State and includes three sections -- the Uinta Basin, Canyon Lands, and High Plateaus. This report determines which bedrock formations are water-bearing and reports on the quality of water in these formations and their yield of water to springs, water wells, and oil and gas wells. The study covers the one-year period from July 1964 to June 1965 and is based on data compiled from published reports and unpublished data in the files of the U.S. Geological Survey, the Utah Oil and Gas Conservation Commission, the Utah State Engineers, the Utah State Department of Health, and oil and gas companies.

In the Uinta Basin, wells and springs have produced fresh to slightly saline water from te Madison Limestone, Morgan Formation, Weber Sandstone, Phosphoria and Park City Formations, Navajo and Entrada Sandstones, Frontier Sandstone Member of the Mancos Shale, Mesaverde Group, and the Wasatch, Green River, Uinta, and Duchesne River Formatons. The major areas of recharge are the north flank of the basin, and Unita Mountains on the north edge of the basin, and the high areas of the south flank. All the permeable formations that crop out along the north flank of the basin are potential freshwater aquifers. Few wells have been drilled, however, and the areal extent of the fresh water is unknown. In most of the central part of the basin, the thick sequence of rocks of Tertiary age and the underlying rocks of Cretaceous age contain water too saline for most uses.

ABSTRACT

Accession Number:
@ 357
Feltis, R.D., and Goode, H.D., 1961, Production and use of fresh water from the Ashley Valley oil field, Uintah County, Utah: Article 184 in Geological Survey Research 1961, U.S. Geological Survey Professional Paper 424-C.

Contact: Public Inquiries Office (copy)
USGS Library (loan)

Key Categories: UTAH, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 358
Ficke, J.F., Weeks, J.B., and Welder, F.A., 1974, Hydrologic data from the Piceance basin, Colorado: Colorado Water Resources Basic-Data Release No. 31, Denver, Colorado, Dept. of Natural Resources and the U.S. Geological Survey, 246 p.

Contact: Lucy Laughlin (copy)
USGS Library (loan)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SPRINGS

Access Code: 011 Use Code: 01

The purpose of this report is to make available to the public water data collected in and compiled for the Piceance basin. The data in this report was compiled under a cooperative project between the Colorado Department of Natural Resources and the U.S. Geological Survey. The project began in June 1972 and ended in July 1974. Included in this report are groundwater and surface-water data collected by the USGS and private companies.

Groundwater data from 52 wells are summarized in this report and located on a map. Pertinent information for each well is summarized in a table, including; ownership, altitude of land surface, and type of information available on each. Of the 52 wells, 25 have transmissivity data, 16 have discharge data, 39 have temperature data, 8 have vertical flow data, 37 have specific conductance data, 17 have common ion data, and 18 have trace element data. A potentiometric surface map for the Piceance Creek basin for June-October 1972 is shown.

Streamflow and/or water quality data are summarized for 37 stations in the basin. The stations are located on a map with pertinent information summarized in a table. Daily streamflow records are reported for 3 stations, water quality data for 4, and measurements of flow on a weekly basis for 32 stations. Ten stations are on streams and 26 show discharge from springs. The report includes all surface water data available except for the station, White River below Meeker, which is published in the water-supply paper series.

1071

ABSTRACT

Accession Number:
@ 358.1
Ficke, J.F., Weeks, J.B., and Welder, F.A., 1973, Selected hydrologic data from the Piceance basin, Colorado: U.S. Geological Survey Open-File Report.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 02

The need for more information on the water resources of the Piceance basin has led to a cooperative project between the Colorado Department of Natural Resources and the U.S. Geological Survey. The project began in June 1972 and was scheduled for completion by July 1974.

The purpose of this report is to make available to the public water data collected in and compiled for the Piceance basin. Included in this report are groundwater and surface water data collected by the Geological Survey and other government agencies.

ABSTRACT

Accession Number:
@ 359
Fields, F.K., 1975, Estimating streamflow characteristics for streams in Utah using selected channel-geometry parameters: U.S. Geological Survey Water-Resources Investigations 34-74, 12 p.

Contact: Public Inquiries Office (copy)

Key Categories: SURFACE WATER QUANTITY, UTAH

Access Code: 112 Use Code: 01

Channel-geometry parameters are related to mean annual streamflow and the 25- and 50-year recurrence-interval flood discharges of Utah streams.

Channel width and depth between depositional bars can be used to estimate mean annual streamflow for perennial streams with a standard error of estimate of 34 percent. The standard error of estimate of mean annual streamflow for ephemeral streams is 73 percent.

The 25- and 50-year floods on perennial and ephemeral streams can be estimated from the channel width between depositional bars with standard errors of estimate ranging from 28 to 43 percent.

ABSTRACT

Accession Number:
@ 360
Fields, F.K., 1975, Streamflow characteristics in northeastern Utah and adjacent areas: U.S. Geological Survey Open-File Report (duplicated as Utah Basic Data Release 25), 190 p.

Contact: USGS - Salt Lake City (copy)

Key Categories: SURFACE WATER QUANTITY, UTAH

Access Code: 011 Use Code: 01

This report contains statistical summaries of streamflow records from 74 gaging stations, which are mostly in northeastern Utah. Low-flow, high-flow, and flow-duration summaries were compiled from daily discharge values; and flows of each month are compared through correlation with flows of 1, 2, and 12 months in the future.

ABSTRACT

Accession Number:
@ 361
Fields, F.K., and Adams, D.B., 1975, Estimates of temperature and precipitation for northeastern Utah: U.S. Geological Survey Journal of Research, v. 3, no. 2, p. 131-136.

Contact: USGS Library (loan)

Key Categories: CLIMATE, UTAH

Access Code: 002 Use Code: 01

This study prsents a method for estimating precipitation and temperature for areas with no climatic monitoring stations. Data from established climate-monitoring stations were converted to a common time base and regression techniques were used to relate climatic indices at these stations to location and elevation. Equations derived from the regression analysis can be used to predict average annual temperature and average annual precipitation at ungaged areas.

ABSTRACT

Accession Number:
@ 362
Fields, F.K., and Adams, D.B., Jan. 1976, Climatic and streamflow estimates for northeastern Utah: U.S. Geological Survey Open-File Report 75-673, 47 p.

Contact: Open-File Services Section (copy)

Key Categories: UTAH, CLIMATE, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 01

This report shows how information from 44 air-temperature, 59 precipitation, and 86 streamflow sites along the White River in Colorado and Utah, the Duchesne and the Upper Green Rivers and their tributaries was converted to a common-time base of 1941-70, and how general relations were developed to extend the converted point values to unsampled sites.

Two methods, regression and ratio, were used to convert the data to a common-time base. Both methods require a period of concurrent data at two sites. After an estimating equation has been defined from concurrent data, the regression method requires data at the independent site only during the record voids of the dependent site. The independent site must have a complete record, however, if the ratio method is to be used.

Regression techniques were used to fill voids in the air-temperature data base and to determine the correlation of monthly and annual averages, the average annual distribution, and equations that can be used to estimate average monthly and seasonal air temperature, precipitation, and streamflow. Incomplete precipitation and streamflow records were adjusted to the 1941-70 average on the assumption that the ratio of concurrent data is directly proportional to the ratio of the respective 1941-70 average annual values at nearby sites.

Altitude and location can be used to estimate the average annual temperature and precipitation. Schematic diagrams, plotted by computer, were prepared to show variations of altitude, temperature, and precipitation. Maps, also plotted by computer, show lines of equal altitude, precipitation, and temperature.

Average annual streamflow can be estimated on the basis of drainage area and the average annual precipitation. Equations for these estimates have standard errors of estimate ranging from 30 to 125 percent.

ABSTRACT

Accession Number:
@ 363
Fischer, R.C., 1980, Water politics: in Proceedings of the 13th Oil
Shale Symposium, Colorado School of Mines Press, Golden, Colorado,
p. 335-336.

Contact: Colorado School of Mines (copy)

Key Categories: COLORADO, WATER LAW, AVAILABLE WATER BY BASIN

Access Code: 011 Use Code: 03

This paper very briefly overviews the history of the political conteroversy surrounding the Colorado River, starting with the 1922 Colorado River Compact. The author makes the point the Colorado has enough water available from its allocated compact share from the Colorado River for its present and future irrigated agriculture and reasonable energy development, probably as much as one to one-and-one-half million barrels per day and associated municipal requirements. However, this will require the construction of new reservoirs, which has been politically unacceptable.

ABSTRACT

Accession Number:
@ 364
Fischer, R.C., 1974, Colorado oil shale and water: in Quarterly
of the Colorado School of Mines, Golden, Colorado, v. 69, no. 2.,
p. 133-139.

Contact: Colorado School of Mines (copy)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, PROCESS WATER USE

Access Code: 011 Use Code: 03

This article discusses water use and supply for an oil shale industry from the perspective of the Colorado River Water Conservation District. It discusses pros and cons of water supply from existing or proposed federal reclamation projects in western Colorado.

1072

ABSTRACT

Accession Number:
@ 364.1
Fisher, W.H., Ray, S.B., Rask, G.D., and Wyatt, W.L., 1978, A guide
to Colorado water law: Colorado Water Resources Institute report,
80 p. plus appendix.

Contact: Environmental Resources Center (copy)

Key Categories: COLORADO, WATER LAW

Access Code: 011 Use Code: 03

The purpose of this manual is to provide a general guide to the law of the use of water. The rules stated are general ones, and the intent is to give the lay individual a basic understanding of the subject.

The report discusses water rights, specific structures and sources of water (ditches, reservoirs, irrigation districts, etc.), wells, and augmentation plans. An appendix presents class notes for a lecture on "Colorado Water Law."

ABSTRACT

Accession Number:
@ 365
Fish, R.H., Newton, A.S., and Babbitt, P., 1981, Fingerprinting and characterization of carboxylic acids in in-situ oil shale retort and process waters by capillary column gas chromatography-mass spectrometry: Lawrence Berkeley Laboratory Report LBL-12430, 18 p.

Contact: Dick Fish (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 01

Six important in situ oil shale retort and process waters were analyzed for carboxylic acids by capillary column gas chromatography-mass spectrometry. A fingerprint or profile was obtained for Occidental's boiler blowdown process water, retort water and heater-treater process water; Geokinetics' retort water, Laramie Energy Technology Center's Omega-9 and 150 Ton retort waters. The results clearly show significant differences in that each retort or process water contains various mono-, di- and keto-aliphatic carboxylic acids. The Occidental retort and process waters contained normal monocarboxylic acids from C_2-C_{13} and C_2-C_{14}, while the Geokinetics' retort water contained C_2-C_{10} 150 Ton retort water C_2-C_{10} and Omega-9 retort water C_2-C_{14}.

Variations among the retort waters and process waters were more important for the normal dicarboxylic acids. Interestingly, the Occidental retort and process waters contain no C_2-C_7 normal dicarboxylic acids; however, those from C_8-C_{12} were present. The Omega-9 retort water had all normal

dicarboxylic acids, C_2-C_{12}, that were identified, while the 150 Ton sample contained only C_2 and C_4 dicarboxylic acids and the Geokinetics' sample C_2-C_4 and C_8-C_{12}.

ABSTRACT

Accession Number:
@ 366
Fish, R.H., 1980, Speciation of trace organic ligands and inorganic and organometallic compounds in oil shale process waters: in Proceedings of the 13th Oil Shale Symposium, Colorado School of Mines Press, Golden, Colorado, p. 385-391.

Contact: Colorado School of Mines (copy)
Gloria Gill - LBL (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011

Use Code: 02

The isolation and identification of organic ligands and inorganic and organometallic compounds in seven oil shale process waters has been carried out using a number of analytical techniques. Organic ligands, potentially associated with trace metals in the oil shale process waters, were either isolated, after methylene chloride extraction, by low pressure liquid chromatography or directly derivatized using lyophilized samples and then identified by capillar column gas chromatography in combination with electron impact mass spectrometry.

The inorganic and organometallic compounds in these process waters were directly separated by high performance liquid chromatography and detected by graphite furnace atomic absorption spectroscopy (HPLC-GFAA). These initial studies resulted in tentative identification of several inorganic and organoarsenic compounds. A review of the analytical techniques and the identified compounds are presented in this paper.

1073

ABSTRACT

Accession Number:
@ 366.1
Fisher, L.R., Jr., 1980, Impact on water resources from a commercial oil shale project: in Synthetic fuels from oil shale, Symposium papers, Chicago, Illinois, Institute of Gas Technology, 599-619 p.

Contact: Institute of Gas Technology (copy)

Key Categories: SURFACE, EFFLUENTS, PROCESS WATER USE

Access Code: 002 Use Code: 03

Water is involved in the mining and processing of oil shales. Surface water is treated before use in the system. Aquifer water flows through underground permeable layers of sand that will result from mine dewatering. Some of this will be consumed for mine use. Water of reaction, feed shale moisture, and water of hydration are released during the retorting process. The characteristics of this water depend on the particular process, the oil shale mineralogy, and the hydrology of the area. It is typically characterized as follows: high in alkalinity; high in organics; medium to high in solids; high in heavy metals; high in ammonia; and high in hydrogen sulfide. The trace elements present are listed. Carcinogen studies using process and waste waters are described briefly. The control of water pollution and treatment of waste water for reuse or disposal are discussed.

√ 1074

ABSTRACT

Accession Number:
@ 366.2
Fitzpatrick, J.J., ed., 1982, The effects of MIS retorting on groundwater-mineralogy interactions, a background study: draft report prepared by Denver Research Institute, Denver, Colorado, for U.S. EPA, Ada, Oklahoma, 118 p. plus figures and tables.

Contact: Joan Fitzpatrick (loan)

Key Categories: COLORADO, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, ENVIRONMENTAL, LEACHING, IN-SITU, COMPUTER MODELS.

Access Code: 011 Use Code: 01

This report reviews and interprets the hydrology, mineralogy, and groundwater chemistry of the Green River Formation in the Piceance basin. It represents the first phase of a research program to develop a comprehensive model to predict the interaction of groundwater in the Piceance Creek basin with abandoned modified in situ retorts.

This report is the comprehensive data base that will be used in subsequent laboratory, field, and modeling studies. It consists of two volumes. The first volume, the text, reviews and interprets the literature on hydrology, chemistry, mineralogy, and geology of the Piceance basin, tract C-a, and tract C-b. Available data on well completions, aquifer tests, groundwater quality and in situ leaching are summarized. The second volume is a compilation of figures and tables containing relevant data on the Piceance basin and tracts C-a and C-b, from other sources.

1075

ABSTRACT

Accession Number:
@ 366.3
Fletcher, J.E., and Reynolds, G.W., 1972, Snowmelt peak flows and antecedent precipitation: in Watersheds in transition, Proceedings of symposium, Fort Collins, CO, American Water Resources Association proceedings series no. 14, p. 197-199.

Contact: none

Key Categories: UTAH, CLIMATE, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

Forecasts of snowmelt peak flows are described for the region bounded on the south by Cedar City, Utah, on the North by Pocatello, Idaho, on the west by the Nevada state line, and on the east by the Green River. The forecasts were based primarily on snowfall. Snow water equivalent was chosen to represent snowfall. All of the snow courses in the area with records long enough to establish 10-year snow water equivalent values were used in the study. The data were arrayed and plotted. The annual and 10-year values were picked off the curve. All values were expressed as a percentage of the 2.33-year value. Thus, the annual snow water equivalent would be 100%.

ABSTRACT

Accession Number:
@ 367
Fletcher, K., and Baldwin, M.F., eds., Oct. 1973, A scientific and policy review of the final environmental impact statement for the prototype oil shale leasing program of the Dept. of Interior: submitted by the Environmental Impact Assessment Project of the Institute of Ecology, Washington, D.C., 197 p.

Contact: none

Key Categories: ENVIRONMENTAL, SURFACE

Access Code: 011 Use Code: 01

This report presents a review of the final Environmental Impact Statement (EIS) on the Department of Interior proposed prototype oil shale leasing program (Abstract Nos. 479-482). It provides scientific criticism and information intended to help the Secretary of Interior decide the fate of the proposed program. Program design, alternatives, environmental impacts, public particpation, and legal aspects are all examined. The review includes findings and recommendations directed at assisting the decision-making process within the Department of the Interior.

ABSTRACT

Accession Number:
@ 368
Flug, M., and others, Aug. 1977, The impact of energy development on water resources in the Upper Colorado Basin: Office of Water Research and Technology, U.S. Dept. of Interior, 159 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, SURFACE WATER QUANTITY, ENVIRONMENTAL MODELING

Access Code: 011 Use Code: 03

The Upper Colorado River Basin contains appreciable amounts of undeveloped coal, oil shale, and uranium resources, which are important in the national energy demand system. A mathematical model, which simulates the shale and water exchange phase of potential fuel conversions, has been developed, based on a subbasin analysis identifying available mineral and water resources. Potential energy developments are evaluated with respect to the resulting impacts upon both the quantity and salinity of the waters in the Colorado River. Model solutions are generated by use of a multilevel minimum cost linear programming algorithm, minimum cost linear programming algorithm, minimum cost referring to the cost of developing predetermined levels of energy output. Level one in the model analysis represents an aggregation of subbasins along state boundaries and thereby optimizes energy developments over the five states of the Upper Colorado River Basin. In each of the five second level problems, energy development over a subbasin division within the respective states are optimized. Development policies which use high salinity waters of the Upper Colorado River enable a net salinity reduction to be realized in the Colorado River at Lee Ferry, Arizona.

ABSTRACT

Accession Number:
@ 369
Forest Service, 1977, Ashley National Forest, draft environmental statement, Proposed Timber Management Plan, U.S. Dept of Agriculture, Intermountain Region.

Contact: BLM - Vernal (loan)

Key Categories: ENVIRONMENTAL, UTAH, WYOMING

Access Code: 112 Use Code: 03

The Ashley National Forest includes approximately 1,377,000 acres in Daggett, Duchesne, Summit, Uintah, and Wasatch Counties, Utah, and Sweetwater County, Wyoming.

The major objective of the timber management planning is to provide orderly and sustained guidance for developing and utilizing the timber growing capacity of the National Forests. The purpose of this environmental statement is to evaluate the overall effects of the timber management plan on the environment, society, and the economy. Alternative courses of action are presented. This environmental statement deals with overall issues and broad alternatives relating to the timber management plan, while specific impacts of individual timber sale proposals will be described and evaluated in the proposed project environmental analysis reports.

✓ 1076

ABSTRACT

Accession Number:
@ 369.1
Fox, J.P., 1980, Water-related impacts of an in-situ oil shale processing: Lawrence Berkeley Laboratory Rep. LBL-6300, 327p.

Contact: Gloria Gill - LBL (copy)

Key Categories: ENVIRONMENTAL, IN-SITU, EFFLUENTS, LEACHING, COLORADO, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

This study discusses the water-related impacts of an in-situ oil shale industry located in the Upper Colorado River Basin. It focuses on a 50,000 barrel per day industry based on the modified in-situ process and located in the Piceance Creek Basin, Colorado. It reviews the history of oil shale development in the United States and the reserves, geology, and characteristics of domestic oil shales. In-situ technologies that have been tested or are under active consideration for commercialization are reviewed, and their commercial potential is evaluated. The existing hydrology and water quality of the Upper Colorado River Basin is surveyed as is water use and statuatory framework for water availability and water quality for in-situ oil shale development. The major environmental problem of in-situ processing, groundwater disruption from in-situ leachates and large-scale dewatering, is analyzed, pertinent experimental results are summarized and interpreted, and recommendations are made for additional research. Methods to control groundwater disruption are identified and discussed and preliminary cost projections are developed. Finally, the reuse, treatment and disposal of effluents produced by in-situ retorting -- retort water, gas condensate, mine waters, and others -- are discussed.

ABSTRACT

Accession Number:
@ 370
Fox, J.P., 1981, Elemental composition of simulated in-situ oil shale retort water: in Analysis of waters associated with alternative fuel production, Jackson, L.P. and Wright, C.C., eds., ASTM STP 720, (Also published as Lawrence Berkeley Laboratory Rep. LBL-9279, April 1980), p. 101.

Contact: Gloria Gill - LBL (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

This paper presents the abundances of 47 elements in 23 unfiltered retort waters from the three simulated in situ retorts and of 17 elements in the dissolved and particulate fraction of 11 of these waters. This work indicates that for most of the unfiltered waters, the carbon, hydrogen, nitrogen, and sulfur occur at concentrations greater than 0.1 percent; that aluminum, arsenic, calcium, iron, potassium, sodium, nickel, and chlorine occur at concentrations greater than 1 ppm and less that 0.1 percent; and that all other measured elements occur at concentration of less than 1 ppm. The particulate fraction in these waters ranges from 203 to 2984 mg/litre, and, in most waters, iron, nickel, potassium, and calcium occur at concentrations that are greater than 0.1 mg/litre. (Carbon, hydrogen, nitrogen, and sulfur were not measured in the particulates.) All other measured elements (titanium, vanadium, chromium, manganese, gallium, arsenic, selenium, bromine, rubidium, strontium, yttrium, mercury, and lead) typically occur at concentrations of less than 0.05 mg/litre in the particulates. About 1 percent of the total elemental mass of potassium, arsenic, and selenium occurs in the particulates, while significantly greater than 1 percent of the elemental mass of iron, chromium, mercury, and nickel may be present as particulate matter. The dissolved metal content of some waters was significantly reduced during filtration by crystallization and bacterial uptake.

ABSTRACT

Accession Number:
@ 371
Fox, J.P., 1979, Water quality effects of leachates from an in situ oil shale industry: Lawrence Berkeley Laboratory Rep. LBL-8997, 40 p.

Contact: Gloria Gill - LBL (copy)

Key Categories: LEACHING, IN-SITU

Access Code: 011 Use Code: 02

This study assembles information available in 1979 on the leaching of residuals from an in situ oil shale facility. Leaching data are presented in a tabular format and used to estimate the impact of leachate discharges on water quality in the vicinity of tracts C-a and C-b. The report evaluates the effect of leachate from abandoned in situ retorts and surface disposal piles of a 100,000 bbl/day, modified in situ facility on the quality of the surface water and groundwater of the Upper Colorado River Basin.

ABSTRACT

Accession Number:
@ 372
Fox, J.P., and Jackson, D.L., May 1980, Potential uses of spent shale in the treatment of oil shale retort waters: in Processing needs and methodology for wastewaters from the conversion of coal, oil shale and biomass to synfuels, U.S. DOE Rep. DOE/EV-0081, p. 0-1.

Contact: Charles Grua (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

This paper summarizes the results of research at Lawrence Berkeley Laboratory on the use of spent shale to treat in situ oil shale process waters. Research results are reported for batch and column studies in which several surface and in situ spent shales were contacted with three in situ retort waters.

These studies indicated that spent shale may be used to reduce the organic and inorganic carbon, electrical conductivity, color and odor, and to elevate the pH of retort waters and gas condensate. This suggests that a packed bed of spent shale could be placed ahead of the ammonia removal step in a treatment facility. The increase in pH would facilitate the stripping of ammonia. The removal of toxic or refractory organic compounds would improve the performance of biological treatment and reduced concentrations of organic and inorganic carbon would decrease the load of these constituents on subsequent treatment steps.

ABSTRACT

Accession Number:
@ 373
Fox, J.P., and Phillips, T.E., 1980, Wastewater treatment in the oil shale industry: in Petersen, K.K., ed., Oil shale, the environmental challenges, Golden, Colorado, Colorado School of Mines Press, p. 253-284.

Contact: Colorado School of Mines (copy)
Gloria Gill - USGS (copy)

Key Categories: EFFLUENTS, IN-SITU, SURFACE

Access Code: 011 Use Code: 01

This paper reviews the subject of wastewater treatment for an oil shale industry and identifies key issues and research priorities that must be resolved before a large scale commercial industry can be developed. It focuses on treatment of water unique to an oil shale industry -- retort water, gas condensate, and mine water. The paper reviews the origin, composition, and volumes of each of these three effluents and discusses general treatment consideration for each. Treatability research that has been completed on each type of water is reviewed. The majority of this work has focused on retort waters, which are difficult to treat with existing technology. The paper presents the results of studies to remove suspended solids, dissolved gases and inorganics, dissolved organics, and trace constituents. Source control and the use of more exotic treatment methods, such as reverse osmosis and evaporation, are discussed. Relatively less work has been completed on the treatment of gas condensates and mine waters. However, preliminary studies suggest that these waters may be readily treated with existing technology.

ABSTRACT

Accession Number:
@ 374
Fox, J.P., Jackson, D.E., and Sakaji, R.H., 1980, Potential uses of spent shale in the treatment of oil shale retort waters: in Proceedings of the 13th Oil Shale Symposium, Golden, Colorado, Colorado School of Mines Press, p. 311, (Also published as Lawrence Berkeley Laboratory Rep. LBL-11072).

Contact: Gloria Gill - LBL (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

This paper evaluates two potential uses of spent shale for the treatment of in-situ oil shale process water: in-situ treatment in an abandoned retort and surface treatment by columns of spent shale. Batch and column studies were conducted using four in-situ retort waters, one gas condensate, and six spent shale. The effect of spent shale contact on the organic and inorganic carbon, conductivity, and pH of the waters was determined and related to specific surface area of the shale and retort operating conditions.

These studies indicate that spent shale may be used to reduce the organic and inorganic carbon, conductivity, color, and odor and elevate the pH of retort waters and gas condensate. Spent shale reduces the inorganic carbon by 47 to 98%, the orgnanic carbon by 7 to 66%, and elevates the pH from initial levels of 8 to 9 up to 10 to 11. TOSCO II spent shale was the best adsorbent for organic carbon, while Lurgie and simulated in-situ spent shales achieved the highest inorganic carbon reduction. These results suggest that a packed bed of spent shale could be placed ahead of an ammonia removal step in a retort water treatment system. The increase in pH achieved by the spent shale column would convert ammonium to ammonia which could be readily stripped. The simultaneous reduction in electrical conductivity and dissolved organic and inorganic carbon by the spent shale column would decrease the load of these constituents on subsequent treatment steps.

√ 1077

ABSTRACT

Accession Number:
@ 374.1
Fransway, D.F., 1980, Salt release and migration in Paraho processed oil shale: M.S. Thesis, Soil Science and Biometeorology, Utah State University, Logan, Utah, 91 p.

Contact: A.J. Simonds (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 02

The saline characteristics of Paraho processed oil shale were investigated in a two-phase series of laboratory experiments. The first phase studied the release of salts from two naturally distributed shale particle sizes packed in lysimeters constructed of plastic pipe and subjected to five leaching situations. The second phase of the experiments involved subjecting three particle sizes of shale to a variety of shale-to-water ratios. The subsequent solutions were analyzed for electrical conductivity and concentrations of Ca, Mg, Na, K, Cl, and SO_4.

The lysimeter experiments demonstrated the very soluble nature of the salts present in the Paraho processed shale. These salts are primarily composed of magnesium, sodium and sulfate and are predominately in the precipitated form, existing external to the shale. The most efficient salt removal treatments were those in which 12.7 cm of water were applied in pulses. To reduce the EC to acceptable levels in the top 45 cm of the profile usually required 100 cm or more of applied water. Model predictions of the salt content in the shale tended to overestimate the EC initially and underestimate it at the final sampling times.

Results of the batch studies indicate a proportional relationship between dilution ratios and electrical conductivity on a log-log scale. As in the lysimeter experiments, ion analysis showed magnesium and sodium to be as much as 93% of the total water soluble cations and sulfate to be the dominant anion. Similar EC and dilution ratio relationships were observed for the cation sums.

ABSTRACT

Accession Number:
@ 375

Freudenthal, D.D., Ricciardelli, P., and York, M.N., 1974, Coal development alternatives--an assessment of water use and economic implications: Wyoming Dept. Economic Planning and Development, 101 p. plus appendices.

Contact: BLM - Cheyenne (loan)

Key Categories: WYOMING, PRESENT WATER USE

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 376
Frey, J.H., 1980, Environmental impacts of oil shale waste disposal: (citations from the Energy Data Base), report for Jan. 1976 - June 1980, New England Research Application Center, Storrs, CT, 82 p.

Contact: NTIS (copy)

Key Categories: ENVIRONMENTAL, LEACHING, REVEGETATION, EFFLUENTS, IN-SITU, COLORADO, UTAH, WYOMING, BIBLIOGRAPHY

Access Code: 002 Use Code: 02

This retrospective bibliography contains citations concerning the impacts upon the environment of the disposal of wastes from the mining and processing of oil shale. Methods for the control or minimization of environmental damage caused by these activities are also covered. (Contains 67 citations.)

ABSTRACT

Accession Number:
@ 377
Frickel, D.G., 1978, Hydrologic and geomorphic data from the Piceance basin, Colorado 1972-1977: USGS Open-File Report 78-825, 169 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, CLIMATE, SEDIMENT

Access Code: 002 Use Code: 01

Erosion measurements made during the period 1972-77 in the Piceance basin of northwestern Colorado are presented in tabular form. Most of the measurements consist of repeated surveys of ground-surface altitudes along monumented transects at 45 hillslope sites and 121 channel sites. The sites were generally resurveyed annually and after significant hydrologic events. Also included are precipitation, runoff, and sediment-yield data for five small plots with different physical characteristics. The data were collected as part of erosion rate, sediment transport, and channel morphology studies being conducted in conjuntion with development of the oil-shale resource of the area. The channel measurements were made to determine rates of aggradation, degradation, and lateral movement. The hillslope measurements were obtained to show rates of soil erosion in the area.

ABSTRACT

Accession Number:
@ 378
Frickel, D.G., Shown, L.M., and Patton, P.C., 1975, An evaluation of hillslope and channel erosion related to oil shale development in the Piceance Basin, Northwestern Colorado: Colorado Water Resources Circular No. 30, 37 p.

Contact: Lucy Laughlin (copy)

Key Categories: COLORADO, SEDIMENT

Access Code: 011 Use Code: 01

A quantitative study of hillslope- and channel-erosion rates and the effect of development of the oil-shale resource on these rates was begun in the Piceance basin of Colorado in 1972. Erosion data obtained during the first year of the study are presented along with an assessment of the geomorphic process active in the area and some estimates of present and potential sediment yields.

Permanent measurement transects established on 26 hillslopes and 11 stream channels showed little change during 1 year of observation. Estimates of source-area and basin sediment yields were made for the Piceance Creek and Yellow Creek basins using a modification of a qualitative reconnaissance method developed by the Pacific Southwest Inter-Agency Committee. Estimates of source-area sediment yields range from 0.2 to 2 acre-feet per square mile (95 to 950 cubic metres per square kilometre). Estimated basin sediment yields for 32 typical basins with areas from 0.3 to 629 square miles (0.8 to 1,629 square kilometres) ranged from 0.1 to 0.7 acre-foot per square mile (48 to 330 cubic metres per square kilometre). The differences between source-area and basin sediment yields are attributed to natural and manmade interruptions of the channel system.

Sediment yields from areas subject to mining and associated activities are expected to be 2 to 4 acre-feet per square mile (950 to 1,900 cubic metres per square kilometre) during the construction period and less than 1 acre-foot per square mile (476 cubic metres per square kilometre) during production. Overburden piles can be expected to produce 0.5 to 1 acre-foot per square mile (240 cubic metres per square kilometre) of sediment initially and less than 0.5 acre-foot per square mile (240 cubic metres per square kilometre) after revegetation. These estimates are subject to revision when more reliable quantitative data become available.

ABSTRACT

Accession Number:
@ 379
Frischknecht, N.C., and Ferguson, R.B., Feb. 1979, Revegetating processed oil shale and coal spoils on semi-arid lands, interim report: Rep. EPA-600/7-79-068, 47 p.

Contact: NTIS (copy)
CERI (copy)

Key Categories: RECLAMATION, SURFACE

Access Code: 011 Use Code: 03

This report summarizes the results of revegetation studies on TOSCO II spent shale at Sand Wash, eastern Utah, within the salt desert shrub zone and at Davis Gulch, western Colorado, in the upper mountain brush zone. These studies used various soil amendments without preleaching of salts.

At Sand Wash, seven species of the Chenopodiaceae family were far superior to other species on processed shale with or without supplementary water or a covering of soil. Where at least 1 foot (30 cm) of soil covered processed shale, an additional 8 species showed good survival. Drip irrigation greatly benefited overall plant establishment on processed shale, whereas litttle improvement was seen from the same amount of water where depth of soil over processed shale was 1 foot (30 cm) or more.

At Davis Gulch, a covering of 8 to 12 inches (20 to 30 cm) of topsoil over processed shale greatly increased survival and growth of container-grown plants compared to a 2- to 3- inch (5 to 7.5 cm) covering of broken rock fragments or a cover of barley straw crimped into the processed shale. Through the third growing season at least, plant survival and growth on gravelly subsoil from the site was about equal to that where topsoil covered processed shale.

ABSTRACT

Accession Number:
@ 380
Fruchter, J.S., and Wilkerson, C.L., 1980, Characterization of oil shale retort effluents: in Peterson, K.K., ed., Oil shale, the environmental challenges, Golden, Colorado, Colorado School of Mines Press, p. 31-55.

Contact: Colorado School of Mines (copy)
John Fruchter (copy)

Key Categories: EFFLUENTS, SURFACE, IN-SITU

Access Code: 011 Use Code: 02

This paper summarizes characterization studies of several surface and in-situ oil shale processes and discusses research needs. An elemental mass balance for the Paraho Semiworks retort is presented which shows the percent of each element distributed to the retorted shale, oil, water, and gas during retorting. The major organic and inorganic components in gases for the TOSCO II, Paraho, Occidental, and Geokinetics processes are presented, and arsenic and mercury speciation in Paraho gases is summarized. The major elements and several trace elements in products from the refining of a Paraho crude oil are also summarized. The concentrations of As, B, Ca, F, Li, Mo, Na, S, and total organic carbon in retort waters from the Occidental, Geokinetics, Paraho, and TOSCO II processes are compared, and arsenic speciation data for Paraho retort water are presented. The concentrations of major, minor and trace elements in spent shale from the Paraho retort, as measured by several instrumental methods, are tabulated, and concentrations of As, Se, Hg, and Cu as a function of depth in a raw shale core from the Naval Oil Shale Reserve are shown graphically. Some preliminary results from chemical fractionation studies of oils, compled with bioassays, are presented, and the relative mutagenicity of these oils, as determined by the Ames assay, are compared graphically.

ABSTRACT

Accession Number:
@ 381
Fruchter, J.S., Laul, J.C., Petersen, M.R., Ryan, P.W., and Turner, M.E., 1978, High-precision trace element and organic constituent analysis of oil shale and solvent-refined coal materials: in Analytical chemistry of oil shale and tar sands, Advances in Chemistry Series No. 170, Washington, D.C., American Chemical Society, p. 255-281.

Contact: John Fruchter (copy)
ACS (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

Materials from a solvent-refined coal pilot plant and two simulated in situ oil shale retort facilities have been characterized for trace inorganic and organic compounds. The techniques used allowed the determination of some 30 elements, the chemical and physical forms of arsenic and mercury, and a large number of organic compounds. Satisfactory balances were obtained for most trace elements except mercury in effluents from the solvent-refined coal plant and one of the oil shale retorts. Approximately 60 organic compounds were determined quantitatively in process streams from the solvent-refined coal plant, and 20 organic compounds were determined in the crude shale oil from an oil shale retort pilot plant.

ABSTRACT

Accession Number:
@ 382
Fruchter, J.S., and others, May 1979, Source characterization studies at the Paraho Semiworks Oil Shale Retort: Battelle Pacific Northwest Rep. PNL-2945, 70 p. plus appendices.

Contact: John Fruchter (copy)

Key Categories: SURFACE, EFFLUENTS

Access Code: 011 Use Code: 01

This report presents the results of a study of the redistribution of trace and major elements and species during Paraho, direct-mode retorting. A comprehensive sampling and analysis program of feedstock, products, effluents, and ambient particulates was conducted at the Paraho Semiworks Retort during two periods in 1977.

The data were used to construct mass balances for 31 trace and major elements in various effluents, including the offgas. The computed mass balances indicated that -1% or greater fractions of the As, Co, Hg, N, Ni, S, and Se were released during retorting and redistributed to the product oil, retort water, or product offgas. The fraction released for these seven elements ranged from -1% for Co and Ni to 50 to 60% for Hg and N. Approximately 20% of the S and 5% each of the As and Se were released.

ABSTRACT

Accession Number:
@ 383
Gardner, B.D., Lyon, K.S., and Tew, R.O., June 1976, The effects of agriculture in Utah on water transfers to oil shale development: Utah Water Research Laboratory Rep. PRJAE027-1, 57 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: AVAILABLE WATER BY BASIN, PRESENT WATER USE, PROCESS WATER USE, UTAH

Access Code: 011 Use Code: 01

In part I the institutional factors affecting water distribution in the Upper Colorado River basin in general and specifically the Uintah Basin are presented. The historical development of the appropriation doctrine of water allocation is outlined and Utah water policy is examimed. These institutional factors are analyzed in light of the prototype oil shale development in the Uintah Basin and potential impact on the area's agricultural sector. In part II irrigation water is treated as a random variable. Its actual quantity is not known ahead of time. If transfers of water to oil shale production affect the variability of water used in agriculture then there will be impacts in agriculture. The analyses seek to determine the impact upon expected (average) real income (utility), expected profits (net farm income), purchased inputs, the price of water, and the price of land.

ABSTRACT

Accession Number:
@ 383.1
Gardner, B.D., and Lebaron, A.D., Oct. 1968, Some neighborhood effects of oil-shale development: Natural Resources Journal, v. 8, no. 4, p. 569-586.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL, PROCESS WATER USE

Access Code: 002 Use Code: 03

Few of the issues connected with oil-shale development have been as controversial as those surrounding water requirements. The economic impact on the local economy, especially the agricultural sector, will be determined largely by transfer flexibility and whether new water supplies become available. If it is assumed that technology and water prices are such that the industry will demand approximately 250,000 acre-feet of water per year, what are the prospects for obtaining this quantity of water. These possibilities are either to file for rights on newly-developed water or purchase rights from present users of already appropriated water. The difficulty with the first alternative is that interstate compacts and an international treaty with Mexico greatly limit the amount of water available. Therefore, additional irrigation rights will have to be purchased from agricultural users, but these are marginal producers in the oil-shale region.

ABSTRACT

Accession Number:
@ 384
Garland, T.R., Wildung, R.E., and Harbert, H.P., 1979, Influence of irrigation and weathering reactions on the composition of percolates from retorted oil shale in field lysimeters: in Proceedings of the 12th Oil Shale Symposium, Golden, Colorado, Colorado School of Mines Press, p. 52-57.

Contact: Ray Wildung (copy)
Colorado School of Mines (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 01

Major cations, anions, trace elements and dissolved organic C were measured over a two year period in percolate from retorted oil shale collected from irrigated field lysimeters at Anvil Points, Colorado. The investigations indicated that chemical equilibrium was not established over the monitoring period and major changes occurred in percolate composition as a function of applied water volume and water residence time in the shale. Field and laboratory studies indicated that several factors contributed to changes in the chemistry of the shale on weathering. These included recarbonizaton of the surface horizons with atmospheric CO_2 and the activities of microorganisms in surface and subsurface horizons. However, the principal mechanism responsible for observed decreases in pH and the concentrations of some trace elements appeared to be the conversion of major quantities of sulfide in the retorted shale to sulfate through a thiosulfate intermediate.

ABSTRACT

Accession Number:
@ 385
Garland, T.R., Wildung, R.E., and Zachara, J.M., March 1981, A case study of the effects of oil shale operations on water quality: I. history of operations and hydrology controls: draft report prepared by Battelle Pacific Northwest Laboratory, 18 p. plus tables and figures.

Contact: Ray Wildung (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY, GROUNDWATER QUALITY, EFFLUENTS, LEACHING, SURFACE, ENVIRONMENTAL

Access Code: 011 Use Code: 01

Battelle Pacific Northwest Laboratory has conducted a detailed field study of a long-term affects of oil shale operations on water quality. This study was carried out at the IOE Rifle Oil Shale Facility located on the Naval Oil Shale Reserves No. 1 and 3 at Anvil Points, Colorado. This site has been used for oil shale technology development, initially under the direction of the U.S. Bureau of Mines, since 1944.

The purposes of the studies were to 1) identify key parameters for, and validate the results of, laboratory investigations on the mobility of soluble components from materials disposed to the ground and 2) evaluate the effect, if any, of 35 years of oil shale operations on existing surface or alluvial groundwater quality.

This report describes the study site; the history of waste disposal since 1944 as can be documented; the approach, measurements and methodology being used in current studies; and the hydrological controls on water movement and salt concentration necessary to overall evaluation of the impact of past and future operations on water quality. Other reports focus on the behavior of specific inorganic and organic components in oil shale wastes and processes controlling their fate at this site.

ABSTRACT

Accession Number:
@ 386
Garland, T.R., Wildung, R.E., and Zachara, J.M., 1982, A case study of the effects of oil shale operations on water quality: II. macroions: Battelle Pacific Northwest Laboratory Report, [in preparation Jan. 1982].

Contact: Ray Wildung (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY, GROUNDWATER QUALITY, EFFLUENTS, LEACHING, SURFACE, ENVIRONMENTAL

Access Code: 000 Use Code: 01

ABSTRACT

Accession Number:
@ 387
Garland, T.R., Wildung, R.E., and Zachara, J.M., 1982, A case study of the effects of oil shale operations on water quality: III. trace metals: Battelle Pacific Northwest Laboratory Report, [in preparation Jan. 1982].

Contact: Ray Wildung (status)

Key Categories: COLORADO, SURFACE WATER QUALITY, GROUNDWATER QUALITY, EFFLUENTS, LEACHING, SURFACE, ENVIRONMENTAL

Access Code: 002 Use Code: 01

The distribution of trace elements (As, Se, Pb, Li, etc.) was studied in waters of a well-characterized semi-arid watershed proximate to the Anvil Points experimental retorting facility in northwestern Colorado. Surface and alluvial ground waters were collected both above and downstream of an unengineered disposal site which had received both solid (raw and retorted shale) and liquid (process water) wastes.

ABSTRACT

Accession Number:
@ 388
Garland, T.R., Wildung, R.E., and Zachara, J.M., 1982, A case study of the effects of oil shale operations on water quality: IV. organic carbon and nitrogen: Battelle Pacific Northwest Laboratory Report, [in preparation Jan. 1982].

Contact: Ray Wildung (status)

Key Categories: COLORADO, SURFACE WATER QUALITY, GROUNDWATER QUALITY, EFFLUENTS, LEACHING, SURFACE, ENVIRONMENTAL

Access Code: 004 Use Code: 01

The distribution of organic carbon and nitrogen (i.e., alkanes, pyridines, etc.) was studied in waters of a well-characterized semi-arid watershed proximate to the Anvil Points experimental retorting facility in northwestern Colorado. Surface and alluvial ground waters were collected both above and downstream of an unengineered disposal site which had received both solid (raw and retorted shale) and liquid (process water) wastes.

ABSTRACT

Accession Number:
@ 389
Gates, J.S., and others, 1978, Ground-water conditions in Utah, spring of 1978: Utah Dept. of Natural Resources, Cooperative-Investigations Report No. 17, 63 p.

Contact: Utah Division of Water Resources (copy)
USGS - Salt Lake City (copy)

Key Categories: GROUNDWATER QUANTITY, UTAH

Access Code: 112 Use Code: 03

This is the fifteenth in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow.

The report includes individual discussions of selected major areas of groundwater withdrawals in the State for the calendar year 1977. Water-level fluctuations, however, are described for the period spring 1977 to spring 1978.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-77. Other information that encompasses the study area is combined with data from other parts of the State.

1079

ABSTRACT

Accession Number:
@ 389.1
Gaydos, M.W., 1980, Summary of water-quality data for selected streams in Colorado: U.S. Geological Survey Water-Resources Investigations, Open-File Report 80-682, 148 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

This report presents the first statewide summary of water-quality data for selected streams in Colorado. Included in the report is a tabulation of the 165 surface-water-sampling sites for which five or more analyses of major chemical constituents were available at the end of the 1978 water year and a tabulation of the types -- major chemical constituents, trace constituents, biological constituents, pesticides, or radiochemicals -- and a number of water-quality analyses available for each of the 165 sites. Also included are statistical summaries, including regression summaries showing the relation between specific conductance and major chemcial constituents, for 117 sites for which 20 or more analyses of major chemical constituents are available. Examples of linear-regression plots of specific conductance and selected major chemical constituents based on data from the Eagle River at Gypsum, Colo., are presented. Decisions to modify the frequency of collection or the types of constitutents determined are facilitated by the statistical summaries.

✓

1080

ABSTRACT

Accession Number:
@ 389.2
Geiger, D.L., May 1981, Identification of toxic constituents of oil shale retort waters using chemical fractionation and toxicity bioassays: M.S. Thesis, Department of Zoology and Physicology, University of Wyoming, Laramie, WY, 50 p.

Contact: Harold Bergman (copy)

Key Categories: SURFACE, IN-SITU, EFFLUENTS

Access Code: 011 Use Code: 02

This paper describes and demonstrates an experimental method to identify toxic fractions and constituents in complex wastewaters. The procudure was tested with three oil shale retort waters. Following chemical fractionation of each retort water using an XAD-8 resin collumn, individual fractions were tested using static bioassays with two species of aquatic organisms, Daphnia pulicaria and fathead minnows (Pimephales promelas). The hydrophilic fractions were most toxic, ammonia was one of the principal toxic constituents, and major and trace ions did not contribute substantially to toxicity. With further development, this fractionation method may be useful in providing data needed to design waste treatment processes to remove the toxic agents.

ABSTRACT

Accession Number:
@ 390
Geokinetics, Inc., 1979, GKI water quality studies progress report.

Contact: Bill Sharrer (copy)

Key Categories: IN-SITU, EFFLUENTS, GROUNDWATER QUALITY, UTAH

Access Code: 011 Use Code: 02

This report summarizes analyses of groundwater from the Geokinetics' Seep Ridge Site in Utah and of Geokinetics retort water. The analyzed samples were collected during 1978 and 1979. Statistical analyses (mean, ranges, variance, standard deviation) for nearly 60 chemical parameters are presented.

ABSTRACT

Accession Number:
@ 391
Geokinetics, Inc., 1979, Vegetation - ecoclimatic and soil factors, final environmental research report: Prepared by ERO Associates, Conifer, Colorado, Rep. DOE/LC/10787-51, 119 p.

Contact: NTIS (loan)
Bill Sharrer (loan)

Key Categories: RECLAMATION, IN-SITU, CLIMATE, UTAH

Access Code: 002 Use Code: 01

Vegetation studies were begun on the Geokinetics site during the spring of 1978 and continued through the summer of 1979. The principal components of the two year intensive study include collection and analysis of data in the area of vegetation, ecoclimate, and soils. This report contains the results of the two-year study, presenting data collecting from the three main study topics and interpretive analyses of intra-topical correlations. First year (1978) data, including one-time soil studies, have been previously presented in a series of reports (Olgierson and Martin 1978, Olgeirson 1979a, 1979b, 1979c). Data collected during the second year of study are presented in this report along with first year information (Appendices A through D and Map Pockets). The body of the report combines and correlates data from the permanent sampling sites for both of the years studies. Vegetation, soils, and ecoclimate data are considered separately in these discussion. Correlations and interrelationships between the three main topics are discussed in later sections. Conclusions of the studies are given as a summation of the separate and interrelated findings and as a basis for recommended monitoring programs. An attempt has been made to increase readability by restricting the large amount of data to inclusion into textual areas of the report only as summarized figures and tables. Supporting data have all been placed in the appendices.

ABSTRACT

Accession Number:
@ 392
Geokinetics, Inc., 1979, Vegetation - ecoclimatic and soil factors, final environmental research report: with appendices A5-E1, Prepared by ERO Associates, Conifer, Colorado, Rep. DOE/LC/10787, 188 p.

Contact: NTIS (copy)
Bill Sharrer (loan)

Key Categories: RECLAMATION, IN-SITU, CLIMATE, UTAH

Access Code: 002 Use Code: 02

Vegetation studies were begun on the LOFRECO site during the spring of 1978 and continued through the summer of 1979. The principal components of the two year intensive study include collection and analysis of data in the areas of vegetation, ecoclimate, and soils. This report contains the results of the two-year study, presenting data collected from the three main study topics and interpretive analyses of intra-topical correlations. First year (1978) data, including one-time soil studies, have been previously presented in a series of reports.

ABSTRACT

Accession Number:
@ 393
Geokinetics, Inc., 1979, Vegetation - ecoclimatic and soil factors, final environmental research report: with appendices A-A4, Prepared by ERO Associates, Conifer, Colorado, Rep. DOE/LC/10787, 187 p.

Contact: NTIS (copy)
Bill Sharrer (loan)

Key Categories: RECLAMATION, IN-SITU, CLIMATE, UTAH

Access Code: 002 Use Code: 02

Vegetation studies were begun on the Geokinetics site during the spring of 1978 and continued through the summer of 1979. The principal components of the two year intensive study include collection and analysis of the data in the areas of vegetation, ecoclimate, and soils. This report contains the results of the two-year study, presenting data collected from the three main study topics and interpretive analyses of intra-topical correlations. First year (1978) data, including one-time soil studies, have been previously presented in a series of reports. Data collected during the second year of study are presented in this appendix.

BLM Library
Denver Federal Center
Bldg. 50, OC-521
P.O. Box 25047
Denver, CO 80225

ABSTRACT

Accession Number:
@ 394
Geokinetics, Inc., March 1978, Geokinetics group in situ shale oil recovery project -
first annual report, Nov. 1976 - Dec. 1977: Rep. SAN-1787-12, 60 p.

Contact: U.S. Government Printing Office (copy)

Key Categories: ENVIRONMENTAL, IN-SITU, UTAH

Access Code: 011 Use Code: 03

This is the first progress report on the Geokinetics oil shale project in Utah. The majority of the report presents technical progress on process development. The report contains a two page description of the environmental monitoring program.

ABSTRACT

Accession Number:
@ 395
U.S. Geological Survey, July 1981, Water resources data for Colorado, v. 2, Colorado River Basin above Dolores River, water year 1980: U.S. Geological Survey Water-Data Rep. CO-80-2, 387 p.

Contact: NTIS (copy)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SEDIMENT

Access Code: 011 Use Code: 01

Water-resources data for Colorado for the 1980 water year consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs, and water levels and water quality of wells and springs. This report (Volumes 1, 2, and 3) contains discharge records for about 460 gaging stations, stage and contents of 22 lakes and reservoirs, 4 partial-record low-flow stations, 30 crest-stage partial-record stations, and 50 miscellaneous sites; water quality for 163 gaging stations and 300 miscellaneous sites; and water levels for 55 observation wells. A few pertinent stations in bordering States also are included in this report. The records were collected and computed by the Water Resources Division of the U.S. Geological Survey under the direction of J. F. Blakey, district chief. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Colorado.

BLM Library
Denver Federal Center
Bldg. 85, OC-521
P.O. Box 25047
Denver, CO 80225

ABSTRACT

Accession Number:
@ 396
U.S. Geological Survey, 1981, Water resources data for Wyoming,
v. 2, Green River basin, Bear River basin, and Snake River basin,
Water Year 1980: U.S. Geological Survey Water-Data Report WY-80-2,
269 p.

Contact: NTIS (copy)

Key Categories: WYOMING, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, SEDIMENT, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

Water resources data for the 1980 water year for Wyoming consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of wells. Volume 2 of this report contains discharge records for 62 gaging stations; stage and contents for 3 lakes and reservoirs; water quality for 38 gaging stations and 20 ungaged stations; and water levels for 7 observation wells. Also included are 24 crest-stage partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements and analyses. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Wyoming.

ABSTRACT

Accession Number:
@ 397
U.S. Geological Survey, June 1981, Water resources data for Utah, water year 1980: U.S. Geological Survey Water-Data Report UT-80-1, 684 p.

Contact: NTIS (copy)
USGS - Salt Lake City (copy)

Key Categories: UTAH, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SEDIMENT

Access Code: 011 Use Code: 01

Water resources data for the 1980 water year for Utah consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of ground water. This report contains discharge records for 294 gaging stations; stage and contents for 22 lakes and reservoirs; water quality for 64 hydrologic stations, 194 partial-record stations, and 323 wells; and water levels for 36 observation wells. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as miscellaneous measurements. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Utah.

ABSTRACT

Accession Number:
@ 398
U.S. Geological Survey, 1980, Water resources data for Wyoming,
v. 2, Green River basin, Bear River basin, and Snake River basin,
water year 1979: U.S. Geological Survey Water-Data Report WY-79-2,
283 p.

Contact: NTIS (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, SEDIMENT, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

Water resources data for the 1979 water year for Wyoming consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of wells. Volume 2 of this report contains discharge records for 62 gaging stations; stage and contents for 5 lakes and reservoirs; water quality for 39 gaging stations and 30 ungaged stations; and water levels for 8 observation wells. Also included are 25 crest-stage partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements and analyses. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Wyoming.

ABSTRACT

Accession Number:
@ 399
U.S. Geological Survey, 1980, Water resources data for Wyoming, water year 1976--v. 2, Green River basin, Bear River basin, and Snake River basin: U.S. Geological Survey Water-data Report WY-78-2, 728 p.

Contact: NTIS (copy)

Key Categories: WYOMING, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, SEDIMENT, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 002 Use Code: 02

Water resources data for the 1978 water year for Wyoming consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of wells. Volume 2 of this report contains discharge records for 62 gaging stations; stage and contents for 5 lakes and reservoirs; water quality for 43 gaging stations, 19 ungaged stations, and 75 wells and springs; and water levels for 8 observation wells. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements and analyses. These data represent that part of the national water data system operated by the U.S. Geological survey and cooperating state and federal agencies in Wyoming.

ABSTRACT

Accession Number:
@ 400
U.S. Geological Survey, 1980, Water Resources Data for Colorado, v. 2,
Colorado River basin above Dolores River, Water year 1979: U.S.
Geological Survey Water-Data Report CO-79-2.

Contact: NTIS (copy)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SEDIMENT

Access Code: 002 Use Code: 01

Water-resources data for Colorado for the 1979 water year consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs, and water levels and water quality of wells and springs. This report (Volumes 1, 2, and 3) contains discharge records for about 460 gaging stations, stage and contents of 22 lakes and reservoirs, 4 partial-record low-flow stations, 93 crest-stage partial-record stations, and 200 miscellaneous sites; water quality for 143 gaging stations and 130 miscellaneous sites; and water levels for 55 observation wells. A few pertinent stations in bordering States are also included in this report. The records were collected and computed by the Water Resources Division of the U.S. Geological Survey under the direction of J. F. Blakey, district chief. These data represent that portion of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Colorado.

ABSTRACT

Accession Number:
@ 401
U.S. Geological Survey, 1980, Water Resources Data for Utah, Water year 1979: U.S. Geological Survey Water-Data Report UT-79-1.

Contact: NTIS (copy)

Key Categories: UTAH, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SEDIMENT

Access Code: 002 Use Code: 01

Water resources data for the 1979 water year for Utah consist of records of stage discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of groundwaters. This report contains discharge records for 176 gaging stations; stage and contents for 21 lakes and reservoirs; water quality for 64 hydrologic stations, 183 partial-record stations, and 303 wells; and water levels for 36 observation wells. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as miscellaneous measurements. These data represent the part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Utah.

ABSTRACT

Accession Number:
@ 402
U.S. Geological Survey, 1979, Water resources data for Colorado,
water year 1978, v. 2, Colorado River basin above Dolores River:
U.S. Geological Survey Water-Data Report CO-78-2, 394 p.

Contact: NTIS (copy)

Key Categories: COLORADO, SEDIMENT, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

Water-resources data for Colorado for the 1978 water year consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs, and water levels and water quality of wells and springs. This report (Volumes 1, 2, and 3) contains discharge records for about 440 gaging stations, stage and contents of 25 lakes and reservoirs, 5 partial-record flow stations, 75 crest-stage partial-record stations, and 250 miscellaneous sites; water quality for 140 gaging stations and 60 miscellaneous sites; and water levels for 55 observation wells. A few pertinent stations in bordering States are also included in this report. The records were collected and computed by the Water Resources Division of the U.S. Geological Survey under the direction of J. F. Blakey, district chief. These data represent that portion of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Colorado.

ABSTRACT

Accession Number:
@ 403
U.S. Geological Survey, 1979, Water resources data for Wyoming,
v. 2, Green River basin, Bear River basin, and Snake River basin,
water year 1978: U.S. Geological Survey Water-Data Report WY-78-2.

Contact: NTIS (copy)

Key Categories: WYOMING, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SEDIMENT

Access Code: 002 Use Code: 01

Water resources data for the 1978 water year for Wyoming consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of wells. Volume 2 of this report contains discharge records for 62 gaging stations; stage and contents for 5 lakes and reservoirs; water quality for 43 gaging stations, 19 ungaged stations, and 75 wells and springs; and water levels for 8 observation wells. Also included are 24 crest-stage partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements and analyses. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Wyoming.

ABSTRACT

Accession Number:
@ 404
U.S. Geological Survey, 1979, Water resources data for Utah, water year 1978: U.S. Geological Survey Water-Data Report UT-78-1.

Contact: NTIS (copy)

Key Categories: UTAH, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SEDIMENT

Access Code: 002 Use Code: 01

Water resources data for the 1978 water year for Utah consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of ground water. This report contains discharge records for 255 gaging stations; stage and contents for 21 lakes and reservoirs; water quality for 34 hydrologic stations, 186 partial-record stations, and 275 wells; and water levels for 31 observation wells. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as miscellaneous measurements. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Utah.

ABSTRACT

Accession Number:
@ 405
U.S. Geological Survey, 1978, Water resources data for Colorado, water year 1977, v. 2, Colorado River basin above Dolores River: U.S. Geological Survey Water-Data Report CO-77-2, 368 p.

Contact: NTIS (copy)

Key Categories: SURFACE WATER QUANTITY, SURFACE WATER QUALITY, SEDIMENT, COLORADO, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

Water-resources data for Colorado for the 1977 water year consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs, and water levels and water quality of wells and springs. This report (Volumes 1, 2, and 3) contains discharge records for 424 gaging stations, stage and contents of 25 lakes and reservoirs, 5 partial-record flow stations, 79 crest-stage partial-record stations, and 193 miscellaneous sites; water quality for 134 gaging stations and 60 miscellaneous sites; and water levels for 55 observation wells. A few pertinent stations in bordering States are also included in this report. The records were collected and computed by the Water Resources Division of the U.S. Geological Survey under the direction of J. F. Blakey, district chief. These data represent that portion of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Colorado.

1081

ABSTRACT

Accession Number:
@ 405.1
U.S. Geological Survey, Sept. 1978, Water resources data for Utah, water year 1977: U.S. Geological Survey Water-Data Report UT-77-1, 548 p.

Contact: NTIS (copy)

Key Categories: UTAH, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, SEDIMENT, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 02

Water-resources data for the 1977 water year for Utah consist of records of stage, discharge, and water quality of streams; stages and contents of lakes and reservoirs; and water levels and water quality of ground water. This report contains discharge records for 256 gaging stations; stage and contents for 21 lakes and reservoirs; water quality for 44 hydrologic stations, 161 partial-record stations, and 314 wells; and water levels for 30 observation wells.

ABSTRACT

Accession Number:
@ 406
U.S. Geological Survey, 1977, Water resources data for Colorado, water year 1976, v. 2, Colorado River basin above Dolores River: U.S. Geological Survey Water-Data Report CO-76-2, 683 p.

Contact: NTIS (copy)

Key Categories: SURFACE WATER QUANTITY, SURFACE WATER QUALITY, SEDIMENT, COLORADO, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

Water-resources data for Colorado for the 1976 water year consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs, and water levels and water quality of wells and springs. This report (Volumes 1 and 2) contains discharge records for 404 gaging stations, stage and contents of 24 lakes and reservoirs, 5 partial-record flow stations, 79 crest-stage partial-record stations, and 193 miscellaneous sites; water quality for 103 gaging stations and 60 miscellaneous sites; and water levels for 60 observation wells. A few pertinent stations in bordering States are also included in this report. The records were collected and computed by the Water Resources Division of the U.S. Geological Survey under the direction of J. E. Biesecker, district chief. These data represent that portion of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Colorado.

1082

ABSTRACT

Accession Number:
@ 406.1
U.S. Geological Survey, 1977, Groundwater levels in the United States, 1971-74, Northwestern states: U.S. Geological Survey Water-Supply Paper 2161, 153 p.

Contact: NTIS (copy)

Key Categories: COLORADO, UTAH, WYOMING, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 02

This report was prepared from ground-water levels measured during 1971-74 by the U.S.G.S. in cooperation with the states of Alaska, Colorado, Idaho, Montana, Oregon, Utah, Washington, and Wyoming, and the other agencies. Water-level measurements in wells are given in feet with reference to either mean sea level or land-surface datum. If known, the altitude of the land-surface datum above mean sea level is given in the well description. The height of the measuring point above or below land-surface datum is given in each well description.

ABSTRACT

Accession Number:
@ 407
U.S. Geological Survey, 1977, Water resources data for Colorado,
water year 1975, v. 2, Colorado River basin above Dolores River:
U.S. Geological Survey Water-Data Report CO-75-2, 538 p.

Contact: NTIS (copy)

Key Categories: SURFACE WATER QUANTITY, SURFACE WATER QUALITY, SEDIMENT, COLORADO, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

Water resources data for Colorado for the 1975 water year consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs, and water levels and water quality of wells and springs. This report (Volumes 1 and 2) contains discharge records for 367 gaging stations, stage and contents of 22 lakes and reservoirs, 5 partial-record flow stations, 77 crest-stage partial-record stations, and 4 miscellaneous sites; water quality for 91 gaging stations and 15 miscellaneous sites; and water levels for 49 observation wells. A few pertinent stations in bordering States are also included in this report. The records were collected and computed by the Water Resources Division of the U.S. Geological Survey under the direction of J. E. Biesecker, district chief. These data represent that portion of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Colorado.

1083

ABSTRACT

Accession Number:
@ 407.1
U.S. Geological Survey, 1977, User's guide for U.S. Geological Survey rainfall-runoff models: revision of Open-File Rep. 74-33, U.S. Geological Survey Open-File Rep. 77-884.

Contact: Open-File Services Section (copy)

Key Categories: UTAH, COLORADO, WYOMING, COMPUTER MODELS, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

Modified versions of the rainfall-runoff model described by Dawdy, Lichty, and Bergmann (1972) are used in the U.S. Geological Survey as a means of synthesizing flood discharges for small drainage areas. Synthesized flood discharges derived through use of long-term (60-70 year) rainfall and evaporation data, provide a more representative time base than do short-term (5-15 year) discharge records obtained by conventional stream gaging techniques.

The rainfall, discharge, and evaporation data for use with rainfall-runoff models are stored in the Unit and Daily Values Files. Any of these data which were collected during the current or immediately preceding water year are stored on direct access, online disk files. Older data are stored in sequential files on magnetic tapes. Both the disks and tapes contain short-term data collected by the U.S. Geological Survey for calibration of models and long-term data for use in synthesis of long-term flood records.

Information in this report provides guidelines for the assembly, storage, and retrieval of data needed to use these models, and also provides description and documentation of computer programs for model calibration and flood-record synthesis.

ABSTRACT

Accession Number:
@ 408
U.S. Geological Survey, 1977, Water resources data for Wyoming, water year 1977, v. 2, Green River basin, Bear River basin, and Snake River basin: U.S. Geological Survey Water-Data Report WY-77-2, 484 p.

Contact: NTIS (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SEDIMENT

Access Code: 002 Use Code: 01

Water resources data for the 1977 water year for Wyoming consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of wells. This report, in two volumes, contains discharge records for 214 gaging stations; stage only records for 1 lake; stage and contents for 16 lakes and reservoirs; water quality for 117 gaging stations, 41 ungaged stations, 2 lakes and reservoirs, and 247 wells and springs; and water levels for 45 observation wells. Also included are 101 crest-stage partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements and analyses. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Wyoming.

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1084

ABSTRACT

Accession Number:
@ 408.1
U.S. Geological Survey, 1976, Water resources data for Wyoming, water year 1976, v. 2, Green River basin, Bear River basin, and Snake River basin: U.S. Geological Survey Water-Data Report WY 76-2, 436 p.

Contact: NTIS (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SEDIMENT

Access Code: 002 Use Code: 01

Water resources data for the 1976 water year for Wyoming consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality; lakes and reservoirs; and water levels and water quality of wells. This report, in two volumes, contains discharge records for 226 gaging stations; stage only records for 1 lake; stage and contents for 16 lakes and reservoirs; water quality for 116 gaging stations, 68 ungaged stations, 4 lakes and reservoirs, and 253 wells and springs; and water levels for 48 observation wells. Also included are 111 crest-stage partial recording stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements of analyses. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating state and federal agencies in Wyoming.

ABSTRACT

Accession Number:
@ 409
U.S. Geological Survey, 1976, Hydrologic studies by the U.S. Geological Survey in oil-shale areas of Colorado, Utah, and Wyoming, 1976: Open-File Report, 88 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, WYOMING, UTAH, BIBLIOGRAPHY

Access Code: 011 Use Code: 02

This report describes the water-resources investigation program of the U.S.G.S. that were in progress in 1976 in oil shale region for Colorado, Wyoming and Utah. Many of these have been completed and are abstracted elsewhere in this bibliography. Locations of gaging stations and water-quality measuring sites, frequencies and parameters, and areas of groundwater studies are included in this report. Brief descriptions of studies by investigators who are headquarters outside the Geological Survey's district operations are also included. These studies are research related to oil shale, chemical exchanges in waste material, extraction, water quality, and post-mining reclamation.

√ 1085

ABSTRACT

Accession Number:
@ 409.1
U.S. Geological Survey, 1976, Quality of the surface waters of the United States, 1970: part 9 and 10, Colorado River basin and the Great basin: U.S. Geological Survey Water-Supply Paper 2158, 371 p.

Contact: U.S. Government Printing Office (copy)

Key Categories: COLORADO, UTAH, WYOMING, SURFACE WATER QUALITY, SEDIMENT

Access Code: 002 Use Code: 03

During the water year ending September 30, 1970, the USGS maintained 154 stations on 88 streams for the study of chemical and physical characteristics of surface water in Colorado and Great River basins. Samples were collected daily and monthly at 142 of these locations for chemical-quality studies. Water temperatures were measured continuously at 8 and daily at 45 stations. Quantities of suspended sediment are reported for 34 stations. Sediment samples were collected one or more times daily at most stations, depending on the rate of flow and changes in stage of the stream. Partical-size distributions of sediments were determined at 19 stations.

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1086

ABSTRACT

Accession Number:
@ 409.2
U.S. Geological Survey, 1976, Water resources data for Wyoming, water year 1975: U.S. Geological Survey Water-Data Report WY-75-1, 646 p.

Contact: NTIS (copy)

Key Categories: WYOMING, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, SEDIMENT, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 002 Use Code: 02

Water resources data for the 1975 water year for Wyoming consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality in wells and springs. This report contains discharge records for 215 gaging stations; stage only records for 1 lake; stage and contents for 16 lakes and reservoirs; water quality for 126 gaging stations, 6 partial-record flow stations, 4 lakes, and 188 wells; and water levels for 48 observation wells. Also included are 114 crest-stage partial-record stations. Additional water data were collected at various sites, not part of the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the national water data system operated by the USGS and cooperating state and federal agencies in Wyoming.

ABSTRACT

Accession Number:
@ 410
U.S. Geological Survey, 1976, Hydrologic studies of the U.S. Geological Survey related to coal development in Colorado: U.S. Geological Survey Open-File Report 76-549, 22 p.

Contact: Lucy Laughlin (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 02

This report summarizes the hydrologic studies related to coal development being conducted by the U.S. Geological Survey in the State of Colorado. The information presented in this report should be useful to agencies, groups, and individuals who are interested in the hydrologic aspects of coal development in Colorado.

A description of the hydrologic data-acquisition activities, including parameters collected and frequency of collection, precedes the summaries of the three interpretive studies currently in progress. Each study summary consists of the project title, definition of the problem being studied, objective of the study, approach of the study, and when known, the schedule for completion of the study and proposed report products resulting from the study.

✓ 1087

ABSTRACT

Accession Number:
@ 410.1
U.S. Geological Survey, 1970-1974, Water resources data for Colorado,
Part 2, Water quality records: Denver, Colorado.

Contact: USGS Library (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 011 Use Code: 02

Water quality information is presented for chemical quality, fluvial sediment, and water temperatures. The chemical quality includes concentrations of individual dissolved constituents and certain properties or characteristics such as hardness, sodium-adsorption-ratio, specific conductance, and pH. Fluvial sediment information is given for suspended-sediment discharges and concentrations and for particle size distribution of suspended sediment and bed material. Water temperature data represent once-daily observations except for stations where a continuous temperature recorder furnishes information from which daily minimums and maximums are obtained.

ABSTRACT

Accession Number:
@ 411
U.S. Geological Survey, Jan. 1970, Chemical and radiochemical analyses of water from streams, reservoirs, wells, and springs in the Rulison Project Area, Garfield and Mesa Counties, Colorado: USGS-474-67, Open-File Report.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY, SPRINGS, GROUNDWATER QUALITY

Access Code: 142 Use Code: 03

Project Rulison, a Plowshare Project, is a cooperative effort of the Austral Oil Company, Inc. (operator), the CER Geonuclear Corporation (technical consultant), the U.S. Atomic Energy Commission, and the U.S. Department of Interior. The project is an experimental study to determine the commercial feasibility of stimulating natural gas production in the Rulison gas field by fracturing the reservoir rock with a nuclear explosion.

A program of collecting water samples from surface waters in the Rulison project area and vicinity is being conducted by the U.S. Geological Survey in cooperation with the U.S. Atomic Energy Commission, primarily to provide background data on the quantity and quality of ground and surface waters. A description of the sampling locations and chemical analyses available to date are summarized in this report.

Following the nuclear event, selected wells, springs and cisterns were physically examined to provide background information for evaluation of possible damage complaints. The data acquired in this effort are included in tables 3-6.

ABSTRACT

Accession Number:
@ 412
U.S. Geological Survey, 1964, Quality of surface waters in Utah,
Oct. 1962 to Sept. 1963: U.S. Geological Survey Open-File Report,
77 p.

Contact: Open-File Services Section (copy)

Key Categories: UTAH, SURFACE WATER QUALITY, SEDIMENT

Access Code: 002 Use Code: 02

This data release is a compilation that presents water-quality data for the period October 1962 to September 1963 for Colorado River and great Basins sites. These preliminary data are subject to revision before final publication in the annual series of U.S. Geological Survey Water-Supply papers entitled "Quality of Surface Waters of United States."

The compilation includes information on the chemical quality of the water, on fluvial sediment, and on water temperature. Chemical-quality information is presented on total dissolved solids, on concentrations of individual dissolved constituents, and on certain properties of characteristics such as hardness, percent sodium, and pH. Fluvial-sediment information is presented on suspended-sediment discharges and concentrations and on particle size of suspended sediment. Water-temperature data represent once-daily observations at the time samples were collected.

ABSTRACT

Accession Number:
@ 413
U.S. Geological Survey, 1963, Chemical analyses of surface waters in Utah, Oct. 1959 to Sept. 1962: U.S. Geological Survey Open-File Report, 51 p.

Contact: Open-File Services Section (copy)

Key Categories: UTAH, SURFACE WATER QUALITY

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 414
Geothermal Surveys, Inc., 1979, Hydrology of the Occidental Oil
Shale, Inc. D. A. Shale area, a progress report, 1 Nov. 1978 to
31 May 1979: South Pasadena, CA, 14 p. plus plate.

Contact: Barbara Birman (copy)

Key Categories: COLORADO, CLIMATE, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 02

This is a progress report of a continuing surface and subsurface hydrologic study of the D.A. Shale/Callahan Trust Lands in Garfield County, Colorado, for Occidental Oil Shale, Inc. The study area, referred to as the D.A. Shale Area, is in northwestern Colorado, between Parachute and Roan Creeks north of the Colorado River, and near the towns of Debeque and Grand Valley.

This report presents the hydrologic budget determined for the time period from 1 November 1977 to 31 October 1978. Data used in the hydrologic budget analysis were collected from metereological stations, stream gages, and observation wells. Appendices summarize monthly precipitation and mean monthly temperature data for three sites, mostly runoff at the Logan Wash flume, and static water level data for three bedrock and eight alluvial wells. The locations of meteorological monitoring stations are presented on a 1:24,000 map.

ABSTRACT

Accession Number:
@ 415
Geothermal Surveys, Inc., 1978, Hydrology of the Occidental Oil Shale, Inc., D. A. Shale area, a progress report, 1 Nov. 1977 to 31 Oct. 1978, South Pasadena, CA, 21 p. plus figure.

Contact: Barbara Birman (copy)

Key Categories: COLORADO, CLIMATE, GROUNDWATER QUANTITY, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 02

This is a progress report of a continuing surface and subsurface hydrologic study of the D.A. Shale/Callahan Trust Lands in Garfield County, Colorado, for Occidental Oil Shale, Inc. The study area, referred to as the D.A. Shale Area, is in northwestern Colorado, between Parachute and Roan Creeks north of the Colorado River, and near the towns of Debeque and Grand Valley.

This report presents the hydrologic budget determined for the time period from 1 November 1977 to 31 October 1978. Data used in the balance were collected from metereological stations, stream gages, and observation wells.

Appendices summarize monthly precipitation data for five stations, pan data for two stations, mean monthly temperature data for three stations, and static water level data for three bedrock and nine alluvial wells. Seismic refraction results are presented for two stations. The locations of the metereological and hydrological monitoring stations are presented on a 1:24,000 map.

ABSTRACT

Accession Number:
@ 416
Geothermal Surveys, Inc., 1978, Hydrology of the Occidental Oil Shale, Inc. D. A. Shale area, a progress report, 1 Nov. 1976 to 31 Oct. 1977, South Pasadena, CA, 16 p. plus appendix and plate.

Contact: Barbara Birman (copy)

Key Categories: COLORADO, CLIMATE, GROUNDWATER QUANTITY, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 02

This is a progress report of a continuing surface and subsurface hydrologic study of the D.A. Shale/Callahan Trust Lands in Garfield County, Colorado, for Occidental Oil Shale, Inc. The study area, referred to as the D.A. Shale Area, is in northwestern Colorado, between Parachute and Roan Creeks north of the Colorado River, and near the towns of Debeque and Grand Valley.

Values of precipitation, actual and potential evapotranspiration, and runoff were determined for Logan Wash, Bowdish Wash, and Smith Gulch for the period November 1, 1976 through October 31, 1977. Precipitation, runoff, and actual evapotranspiration were substantially less in this period than in the previous twelve months and less than the corresponding long-term average values. Potential evapotranspiration was essentially the same in this and previous periods.

Appendices summarize monthly precipitation data for three sites, pan evaporation data at one site, mean monthly temperature at three sites, monthly runoff at the Logan Wash flume, and static water level measurements for five bedrock and six alluvial wells. A plate shows the location of meteorological and hydrological monitoring stations.

ABSTRACT

Accession Number:
@ 417
Geothermal Surveys, Inc., 1977, Hydrology of the Occidental Oil
Shale, Inc., D.A. Shale area near Debeque, Colorado: South
Pasadena, California, 78 p. plus plate.

Contact: Barbara Birman (copy)

Key Categories: COLORADO, CLIMATE, GROUNDWATER QUANTITY, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 02

A preliminary hydrologic study has been made of the Occidental Oil Shale, Inc. property and the surrounding area located near DeBeque, Colorado. The purposes of the study are to estimate values for the elements in the hydrologic model and to recommend monitoring procedures to assess any impacts that Occidential's operations may be having on the hydrology of the area. The study is based on data already existing, both for the immediate locale and adjacent areas.

Present estimates of the hydrologic elements are as follows. Precipitation: 17.2 inches/year (43.7 cm/yr). Actual evapotranspiration: 1.7 inches/year (39.9 cm/yr). Surface runoff: 0.2 inches/year (0.5 cm/yr). Total runoff: 0.4 inches/year (1.0 cm/yr). Infiltration: 1.3 inches/year (3.3 cm/yr). Ground water outflow: 1.1 inches/year (2.8 cm/yr).

The report describes the hydrologic model, evaluates precipitation, evapotranspiration, runoff and groundwater of the D.A. Shale area, and makes recommendations for future work. The discussion of each element includes a list of the available data sources, a description of the methods of analysis, and a discussion of the results.

The report includes a series of appendices which summarize monthly and mean annual precipitation and pan evaporation data: summarize calculations of evapotranspiration based on the Blaney-Criddle method; present calculations of flow from flume hydrographs; and summarize static water levels for wells.

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1088

ABSTRACT

Accession Number:
@ 417.1
Gerstle, J.H., and Marks, D.H., Feb. 1979, Water-rights-transfer evaluation procedure with applications for Western energy development: Massachusetts Institute of Technology Rep. MIT-EL-79-019, 75 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, WATER LAW

Access Code: 011 Use Code: 01

This report deals with questions of water supply for coal development in the semiarid western United States. A method is developed to evaluate yields of water rights in appropriation or permit systems of water administration. Water rights are characterized in terms of location, priority, decreed maximum diversion, actual diversion in periods of low flow, and consumptive use. Transfers of water rights are evaluated in this method by using institutional procedures as framework for analysis. A case study is performed on the North Fork of the Powder River, Wyoming, in which institutional considerations are discussed, and water rights are evaluated for a hypothetical facility. This procedure is not limited to energy facilities but may be used in most cases of water rights transfers. The method is designed for use with easily obtained data in order to facilitate its use in practice.

√ 1089

ABSTRACT

Accession Number:
@ 417.2
Ghassemi, M., and Iyer, R., July 1981, Environmental aspects of synfuel utilization: Rep. EPA-600/S7-81-025.

Contact: NTIS (copy)

Key Categories: ENVIRONMENTAL, COLORADO, WYOMING, UTAH

Access Code: 011 Use Code: 01

This study reviews the environmental concerns relating to the distribution, handling, and end use of synfuel products likely to enter the marketplace by the year 2000, and assigns priority rankings to these products based on environmental concerns to aid EPA in focusing its regulatory and research activities. Major products and by-products from oil shale, coal liquefaction, and coal gasification technologies are considered.

Based on current developmental activities, three likely scenarios for shale- and coal-based synfuel plant buildup are projected. The type and quantity of synfuel products and byproducts likely to enter the market are identified and their regional market penetration is estimated. The environmental analysis consists of a review of the available data on the physical, chemical, and health effects characteristics of synfuel products and environmental significance of their characteristics; an analysis of the potential environmental impacts and regional implications associated with the production and use scenarios considered; and a ranking of the products from the standpoint of environmental concerns and mitigation requirements.

The results indicate that: (1) significant quantities of synfuel products are expected to enter the marketplace during the next 20 years; (2) large-scale transportation, distribution, and end use of certain synfuel products can present significant threats to the environment and the public health; (3) based on gross characteristics, synfuel products appear to be similar to petroleum products, but detailed characterization data are not available with which to judge their relative safety; and (4) synfuel test and evaluation programs currently underway or planned provide excellent opportunities for collecting some of the required environmental data.

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1090

ABSTRACT

Accession Number:
@ 417.3
Gibbs, E.J., 1977, An analysis of two seidment yield prediction models applied to a drainage basin in central Utah: M.S. thesis, University of Utah.

Contact: University of Utah Library (loan)

Key Categories: UTAH, SEDIMENT, COMPUTER MODELS

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 418
Gifford, R.O., Ashcroft, G.L., and Magnuson, M.D., Oct. 1967,
Probability of selected precipitation amounts in the western region of the United States: Agricultural Experiment Station, University of Nevada, A Western Regional Research Publication.

Contact: BLM - Cheyenne (loan)
BLM - Vernal (loan)

Key Categories: WYOMING, COLORADO, UTAH, CLIMATE

Access Code: 152 Use Code: 02

This report presents tables of probability of selected precipitation amounts in the 11 western states. The period of record for precipitation data was March 1931 through February 1961. Stations used in developing the probability tables were limited to those with a sufficient period of record which would be representative of a region's agricultural areas. The analysis is based on a 52-week year; week one of each year started on March 1; February 28 and 29 were excluded.

ABSTRACT

Accession Number:
@ 419
Giles, T.F., and Brogden, R.E., 1978, Selected hydrologic data, Yampa River basin and parts of the White River basin, northwestern Colorado and South-central Wyoming: U.S. Geological Survey Open-File Report 78-23, 91 p. plus plates.

Contact: Lucy Laughlin (copy)

Key Categories: COLORADO, WYOMING, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE

Access Code: 011 Use Code: 01

This report contains selected hydrologic data from four energy-related projects conducted by the U.S. Geological Survey in the Yampa River basin and parts of the White River basin in northwestern Colorado and south-central Wyoming. Water-quality data during 1974 and 1975 and parts of 1976 for 129 ground-water sites and 119 surface-water sites are tabulated. For most samples, major cations, anions, and trace metals were analyzed. For the same time period, field measurements of specific conductance, temperature, and pH were made on 252 springs and wells. The chemical data are presented in the tables. These sampling sites, as well as the locations of 20 climatological stations, 18 snow-course sites, and 43 surface-water gaging stations, are shown on maps. Geologic units that contain coal deposits or supply much of the water used for stock and domestic purposes in the area also are shown on a map.

ABSTRACT

Accession Number:
@ 420
Gillette, E. R. ed., May 1976, Energy, water and the West: Washington, D.C., National Conference of State Legislatures, and the American Association for the Advancement of Science.

Contact: DRI (loan)

Key Categories: PROCEEDINGS, UTAH, WYOMING, COLORADO, WATER LAW, ENVIRONMENTAL

Access Code: 042 Use Code: 02

There are several questions that underlie much of the West's concern with energy development and water resources:

- Can the irrigated agricultural industry survive, given the water demands and fiscal resources of energy-related industries?
- What will energy development do to water quality?
- To what extent is the exploitation of the West justifiable in order to service the energy demands of the more populous energy-importing regions of the country?
- What means will be utilized by the federal government to grant allocation permits to water resources on federal lands?

These and similar queries were the focus of the "Energy, Water, and the West" papers and discussions at the 2½-day workshop, cosponsored by the American Association for the Advancement of Science and the National Conference of State Legislatures. The workshop was developed to inform state legislators of the probable impacts of western energy development on western water resources, to facilitate a dialogue between the state policymakers and those principals within the federal agencies that would be formulating the federal programs in this area, to engender effective interstate dialogue, and to determine the extent of knowledge among the western policymakers of the impact that growing energy development would have on present water management programs.

If a unifying thread could have been discerned in the conference, it was that the impact of energy development on western water resource is one, if not the most important, factor in energy development and, though it appears that water is available in the western states, it is not in the right place, and in order to be in the right place at the right time, the states and the federal government must cooperatively develop effective policy and programs.

ABSTRACT

M

Accession Number:
@ 421
Glaze, M., 1981, Removal of boron and fluoride from oil shale leachates by soils in the Piceance Creek basin: draft, Master of Science Thesis, University of Colorado, Boulder.

Contact: Don Runnells (copy)

Key Categories: LEACHING, SURFACE, COMPUTER MODELS

Access Code: 011 Use Code: 01

This thesis presents the results of a laboratory study to evaluate the attenuation of B and F in Paraho spent shale leachates by soils. Leachates were generated by contacting Paraho spent shale with distilled water (1:1 weight:volume) for 120 hours. The resulting leachates were passed through columns packed with soils from the Piceance Creek basin. An existing computer model was modified to simulate the movement of B and F through a column of soil.

These studies revealed that for high pH (12) leachates, B and F were removed from solution by precipitation while at neutral pHs, B and F were removed by sorption. Computer simulations indicated that the distribution coefficients for B ranged from 3.6 to 6.3 ml/gm and for F, from 9.6 to 12 ml/gm. Velocities of F in soils were 60 to 70 cm/yr and for B, 110 to 170 cm/yr. A precipitate of $CaCO_3$ plugged the soil pores in these experiments, suggesting that the maintenance of a high soil pH and Ca content may effectively control the movement of leachates in the field.

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ABSTRACT

√ Accession Number:
@ 422
Gold, H., Goldstein, D.J., Probstein, R.F., Shen, J.S., and Yung, D., 1977, Water requirements for steam electric power generation and synthetic fuel plants in the western United States: Water Purification Associates, Cambridge, Mass., Rep. EPA 600/7-77-037, 259 p.

Contact: Harris Gold (copy)

Key Categories: PROCESS WATER USE, SURFACE

Access Code: 011 Use Code: 01

The study describes the procedures for the detailed determination of the water consumed for mining and processing coal and oil shale, and for determining the residuals generated. The processes considered are Lurgi, Synthane, and Synthoil for coal conversion, TOSCO II for shale conversion, coal-fired steam electric power generation and slurry pipeline. In addition, determiniations are also made of the water consumed for process cooling, flue gas desulfurization, revegetation of mined land, solids disposal and by evaporation and other uses within the mine-plant complex. In these determinations it is assumed that there is no discharge to receiving waters and that there is a reasonably high level of recycle and reuse of process effluent waters. Wasteful evaporation of wastewater is not permitted. Economic studies of water treatment are not included in this assessment except for some of the process cooling studies.

The consumptive water use and solids residuals are determined for a total of 21 plant-site combinations. The sites are: Beulah, North Dakota; Colstrip, Montana; Gillette, Wyoming; Kaiparowits/Escalante, Utah; Navajo/Farmington, New Mexico; and Rifle, Colorado. A detailed breakdown by consumptive water use category is presented in tabular form for each plant-site combination. Approximately twenty water use categories are considered.

1091

ABSTRACT

Accession Number:
@ 422.1
Gold, H., and Goldstein, D.J., 1977, Water related environmental effects in fuel conversion, II, appendix volume: Rep. FE-2445-1 (v. 2), 674 p.

Contact: Harris Gold (copy)

Key Categories: PROCESS WATER, SURFACE, IN-SITU

Access Code: 011 Use Code: 01

This report examines some water-related effects that could be expected from siting specific conversion plants at given locations in the major coal and oil shale bearing regions of the United States. A total of 90 plant-site combinations were studied: 48 in the Central and Eastern regions and 42 in the Western region. The synthetic fuel technologies examined include: coal gasification to convert coal to pipeline gas; coal liquefaction to convert coal to low sulfur fuel oil; coal refining to produce a de-ashed, low sulfur solvent refined (clean) coal; and oil shale retorting to produce synthetic crude. The results presented include the range of water requirements, the conditions for narrowing the range and optimizing the use of water, the ranges of residual solid wastes, and the cost and energy requirements for wastewater treatment. A comparison of the water requirements with those of two recently published studies shows widely varying estimates and emphasizes the need for both site- and design-specific calculations. A general assessment of the water resources data in the coal and oil shale regions was made. Potential water supply sources for each site were evaluated in terms of the available water supply. The degree of wet cooling used to dissipate waste heat was determined on the basis of water availability and cost.

1092

ABSTRACT

Accession Number:
@ 422.2
Goode, H.D., 1963, Utah: [in McGuinness, ed., The role of groundwater in the national water situation, U.S. Geological Survey Water-Supply Paper 1800, p. 864-887.

Contact: USGS Library (loan)

Key Categories: UTAH, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 03

This article is a chapter from a book which overviews the role of groundwater on a national scale. A single chapter is devoted to the groundwater situation in each state. The chapter on Utah reviews groundwater studies that have been completed in the State. The occurrence and use of groundwater in alluvial aquifers and bedrock aquifers in the State are reviewed. This is followed by a discussion of groundwater problems in the State. These include a discussion of specific water problems in the Great Basin, the Colorado Plateau, and Rocky Mountains; the need for additional hydrologic information; and the need for development of substantial additional supplies of groundwater.

ABSTRACT

Accession Number:
@ 423
Goode, H.D., and Feltis, R.D., 1962, Water production from oil wells of the Uinta Basin, Uintah and Duchesne Counties, Utah: Utah Geological and Mineralogical Survey, Water Resources Bulletin 1, 32 p. plus 2 plates.

Contact: USGS - Salt Lake City (loan)

Key Categories: UTAH, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

This work tabulates and discusses the quantity and types of water that are produced by oil wells in Uintah and Duchesne counties in the Uinta Basin. Oil- and water-production, chemical quality, and geologic data were compiled from well logs and published reports. About 30 samples of water were collected and analyzed. The report briefly discusses the disposal of oil-field water and summarizes the geology of the area. Oil field water from the Ashley Valley, Red Wash, Roosevelt, and other fields are described. Tables and figures show the location of oil and gas fields, structure contours on top of the Wasatch formation, description and water-bearing properties of rock in central and eastern part of the Uinta Basin, and chemical analyses of water from selected wells in the Uinta Basin.

Water production from individual oil wells in the Uinta Basin ranges from 0 to 2,920,000 barrels (about 380 acre-feet) per year. The total dissolved solids in the water ranges from 500 to 26,000 ppm). Oil-field-water production in the Uinta Basin annually exceeds 90 percent of the total production in the State, and of this amount about 99 percent is the combined production of the Ashley Valley, Red Wash, and Roosevelt oil fields.

Gordon

1093

ABSTRACT

Accession Number:
@ 423.1
Gordon, E.D., and Whitcomb, H.A., 1963, Wyoming: in McGuinness, ed., The role of ground water in the national water situation: U.S. Geological Survey Water-Supply Paper 1800, p. 960-982.

Contact: USGS Library (loan)

Key Categories: WYOMING, GROUNDWATER QUANTITY

Access Code: 011   Use Code: 03

This article is a chapter from a book which overviews the role of groundwater on a national scale. A single chapter is devoted to the groundwater situation in each state. The chapter on Wyoming reviews groundwater studies that have been completed in the State and includes a tabulation of USGS reports on Wyoming. Groundwater conditions and resources are described for five areas: North Platee and Upper South Platte River basin; the Niobrara, Cheyenne, Belle Fourche, Powder, and Tongue River basins; the Green River basin; and the big Horn River basin; and the Snake and Bear River basins. This is followed by a discussion of problems, prospects, and needs.

ABSTRACT

Accession Number:
@ 424
Gratt, L.B., and others, 1981, Health and environmental effects document for oil shale - 1981: IWG Corp., San Diego, CA, Report IWG-FR-082-01.

Contact: Larry Gratt (copy)

Key Categories: ENVIRONMENTAL, SURFACE, IN-SITU

Access Code: 011 Use Code: 02

This report documents the initial portion of a continuing effort to quantify the health and environmental risks from a hypothetical one-million-barrels-per-day United States oil shale industry for the purpose of identifying research needs. The quantification procedure is based upon assumptions and on both research and engineering data. The 1981 Oil Shale Risk Analysis (OSRA) has established a set of assumptions and structure for use of data to predict the potential human health and environmental risks. The assumptions and data can be reviewed, modified and updated based on ability to reduce major uncertainties affecting the significant risks. The information provided by the current analysis is intended as an aid in formulating and managing a program of environmental research focused on providing information required to reduce uncertainties in critical areas.

1094

ABSTRACT

Accession Number:
@ 424.1
Gray, S.L., 1974, Primary data on economic activity, and water use in prototype oilshale development areas of Colorado: an initial inquiry: Fort Collins, Colorado, Colorado Water Resources Research Institute Completion Report No. 58, 8 p.

Contact: Environmental Resources Center (copy)

Key Categories: COLORADO, ENVIRONMENTAL, PRESENT WATER USE

Access Code: 011 Use Code: 03

Potential impacts of oil shale development on the economies of certain Western Slope communities in Colorado are quite large. These impacts will likely exert a substantial pressure on the land and water resource lease of the area in addition to the effects upon community development, regional income, income distribution, and a changing mix of business activity. In order to approach future research on these issues this "seed" research effort was designed to (1) promote interaction and interchange of ideas among researchers and members of the affected communities, (2) to identify important areas of reserach needs in the oil shale region, and (3) to initialize the collection of primary data depicting the economic structure of the oil shale communities.

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1095

ABSTRACT

Accession Number:
@ 424.2
Green, S.L., 1981, Water resources investigations of the U.S. Geological Survey in Wyoming, Fiscal Year 1980: U.S. Geological Survey Open-File Report 81-201, 118 p.

Contact: Open-File Services Section (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, LEACHING, IN-SITU

Access Code: 011 Use Code: 01

This report describes water-resources studies being conducted by the Water Resources Division of the U.S. Geological Survey in Wyoming during fiscal year 1980. Activities summarized include data collection and water-resource appraisal projects. The data section consists of a series of maps and tables which locate monitoring stations and tabulate pertinent information on each (location, period of record, sampling frequency, etc.) for the following types of stations: water quality, streamflow and reservoir; groundwater; sediment; and peak-flow partial-record. The project section provides the following information on each current project: title; funding agency; project leader; field location; problem; objective; approach; progress and significant results; plans for fiscal year 1980; and reports published during fiscal year 1979.

ABSTRACT

√ Accession Number:
@ 425

Greeson, P.E., ed., 1978, River-quality assessments, proceedings of a symposium: Tucson, Arizona, Nov. 2-3, 1977, American Water Resources Association, St. Anthony Falls Hydraulic Laboratory, Minneapolis, MN, 190 p.

Contact: none

Key Categories: WYOMING, ENVIRONMENTAL, PROCEEDINGS

Access Code: 002 Use Code: 03

River-quality assessments were made during pilot studies on the Willamette River basin in Oregon, the Chattahoochee River basin in Georgia, and the Yampa River basin in Colorado and Wyoming. The ten papers presented at the symposium reported on these pilot studies in the broad subject areas of concept of river-quality assessments and selected methods for addressing river-quality problems.

1096

ABSTRACT

Accession Number:
@ 425.1
Grenney W.J., and Porcella, D.B., 1976, Application of the "SSAM" model to the Green River, Utah: in Clyde, C.G., Falkenborg, D.H., and Riley, J.P., eds, Colorado River basin modeling studies, Utah Water Research Laboratory, p. 569-605.

Contact: Utah Water Research Laboratory (copy)

Key Categories: UTAH, SURFACE WATER QUALITY, COMPUTER MODELS

Access Code: 011 Use Code: 01

In this study a mathematical water quality model was applied to the Green River and its major tributaries between Jensen and Green River City, Utah. The model was calibrated to water quality conditions occuring during the summer of 1973. Changes in this base condition were predicted by the model for population projections to the year 2000 and for the implementation of proposed waste effluent standards.

The mode, SSAM, can simulate nine constituents simultaneously: Two conservative consituents (for example, salinity); a nonconservative substance; coliform bacteria (MPN); ammonium (NH_4); nitrate (NO_3); biochemical oxygen demand (BOD); and dissolved oxygen (DO). User options are available to run any combination of constituents. Reaeration and biological rate coefficients in the model are automatically adjusted for temperature. Saturation concentrations of dissolved oxygen are calculated as a function of temperature and elevation. The model includes the following sources for constituent input: (1) headwater flow, (2) diffuse surface runoff, (3) diffuse subsurface runoff, (4) point loads, and (5) leaching from bottom deposits. Provisions for point diversions and stream flow to groundwater are included in the model. Biochemical interactions are represented by first order, linear differential equations and advection is modeled for conditions of steady flow.

√ 1091

ABSTRACT

Accession Number:
@ 425.2
Grenney, W.J., and Kraszewski, A.K., 1981, Description and application of the stream simulation and assessment model: version IV (SSAM IV), Fish and Wildlife Service Rep. FWS/OBS-81/46, 199 p.

Contact: Western Energy and Land Use Team (copy)
Clair Stalnaker (status)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER, MODELS, SURFACE WATER QUALITY

Access Code: 011 Use Code: 01

The SSAM IV computer model is an updated and user orientated version of water quality computer models which have been applied to the Bear River, Sevier River, Virgin River, and the Salt Lake City canal system in Utah. The physical transport and biochemical and physical reactions are modeled, resulting in concentrations in water quality constituents at specific points in a stream network. Output is any combination of constituents at specified points. The user must supply the data input for the constituent being modeled. Input required includes flows for tributaries and headwaters, point loads, diversions and lateral and subsurface inflows. The model computes a flow balance in the system. The time step is defined by the user but cannot be less than flow travel time through the stream network being modeled.

This document is intended for use by aquatic biologists and water quality engineers who are experienced in water quality studies and who need a water quality computer model. To provide the background necessary to use the SSAM IV computer model, the following information is provided:

1. The mathematical concepts involved in modeling water quality in stream environments.
2. A description of the computer model which incorporates these concepts and can be applied to a specific stream network.
3. A user's guide to developing the input required by the computer model.
4. A specific application of the computer model to the Yampa River system in Colorado.

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1098

ABSTRACT

Accession Number:
@ 425.3

Grenney, W.J., Dixon, L.S., and Teuscher, M.C., 1975, Assessment of proposed river management and planning alternatives by water quality simulation modeling: Utah Water Resources Laboratory Rep. FRWA20-3, Logan, Utah.

Contact: Bill Grenney (copy)

Key Categories: UTAH, COMPUTER MODEL, SURFACE WATER QUALITY

Access Code: 000 Use Code: 02

1099

ABSTRACT

Accession Number:
@ 425.4
Griest, W.H., Guerin, M.R., and Coffin, G.L., eds., 1981, Health effects investigation of oil shale development: Proceedings of the symposium of health effects investigation of oil shale development, Gatlinburg, Tenn., June 23-24, 1980, Ann Arbor Science, Ann Arbor, Mich., 255 p.

Contact: Ann Arbor Science (copy)

Key Categories: ENVIRONMENTAL, SURFACE, IN-SITU

Access Code: 011 Use Code: 02

This volume presents 17 technical papers that address potential health effects associated with the production and refining of shale oil into jet and diesel fuels. These results are relevant to water resources in the oil shale region because oil spills may affect surface and groundwater quality.

Papers included in this volume include: (1) Analysis of shale oil liquids for polynuclear aromatic hydrocarbons and their N-heterocyclic analogs; (2) chronic dermal toxicity of Paraho shale oil and distillates; (3) comparative dermatoxicity of shale oils; (4) carcinogenic bioassay of shale oil refinery streams and downstream products; (5) acute toxicity of selected crude and refined shale oil- and petroleum-derived substances; (6) short-term microbial testing of shale oil materials; (7) toxicity of shale oil to freshwater algae; and others.

Cites from here on

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ABSTRACT

Accession Number:
@ 426
Haas, F.C., 1981, Analysis of TOSCO II oil shale retort water: in Jackson, L.P., and Wright, C.C., eds., Analysis of waters associated with alternative fuel production, ASTM STP 720, p. 18.

Contact: ASTM (copy)

Key Categories: EFFLUENTS, SURFACE

Access Code: 011　　Use Code: 01

A sampling and analysis program for TOSCO II oil shale retort water was conducted at the TOSCO Corporation's 21 773-kg (24-ton)-per-day pilot plant near Golden, Colorado. The sampling and sample storage procedures are presented along with the analyses for common ions and trace metals. The substantial amounts of organic material present were separated by pH extraction and characterized as organic acids, organic bases, neutral oils, and phenolic material.

1100

ABSTRACT

Accession Number:
@ 426.1
Habenicht, C.H., and others, Nov. 1980, Stream stripping and reverse osmosis for the treatment of oil shale wastewaters: report of a field test: Report prepared by Denver Research Institute, Denver, Colorado, and Water Purification Associates, Cambridge, Massachusetts, for Laramie Energy Technology Center, Laramie, Wyoming.

Contact: Dick Poulson (loan)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 002

Use Code: 02

Reverse osmosis and steam stripping have been tested under field conditions as a means of treating wastewaters produced during oil shale retorting. These tests were completed during September 8-18, 1980 in conjunction with the operation of the 150-ton Simulated In Situ Retort located at the Laramie Energy Technology Center. The pilot-scale steam stripper treated and returned wastewater produced by a Venturi scrubber, which was being tested as a means of controlling particulate matter in retort gas.

The steam stripper was successfully integrated into the overall pollution control system which consisted of a scrubber, and thermal oxidizer in addition to the stripper. The efficiency of removal achieved by the stripper was as follows: electrical conductivity, 68%; HN_3-N, 54%; sulfide, >95%, total inorganic carbon, 57%; total organic carbon, 63%.

The bench-scale reverse osmosis system was operated in a batch mode using freshly stripped scrubber effluent and retort water. Rejection of organic carbon was over 98%; electrical conductivity, dissolved residue, sulfide, and CO_2 were normally rejected at levels over 80%.

1101

ABSTRACT

Accession Number:
@ 426.2
Hadley, R.F., and Shown, L.M., 1976, Relation of erosion to sediment yield: in Proceedings of the third Federal inter-agency sedimentation conference, held in Denver, Colorado, March 22-25, 1976, Water Resources Council, Sedimentation Committee, p. 1-132-1-139.

Contact: none

Key Categories: COLORADO, SEDIMENT

Access Code: 002 Use Code: 02

Sediment yield is dependent on the gross erosion in the drainage basin and the transport efficiency of the channel network. Stream-channel characteristics, diversity in landforms, and flood-plain development all are important factors in determining conveyance, or sediment delivery to downstream points. Qualitative evaluation was made to sediment conveyance, on a scale of zero to one for Ryan Gulch basin, northwestern Colorado. The presence of alluvial fans, dams and irrigation works, headcuts and ungillied reaches of valley floor and general channel condition were considered. An average conveyance for the basin was computed by weighting ratings of individual reached. The estimated conveyance for the whole basin indicated that only a very small part of the erroded material is presently being transported through the system.

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1102

ABSTRACT

Accession Number:
@ 426.3
Hail, W.J., 1977, Stewart Gulch Tongue, a new tongue of the Eocene Green River Formation, Piceance Creek Basin, Colorado: Washington, D.C., 8 p.

Contact: U.S. Government Printing Office (copy)

Key Categories:

Access Code: 000 Use Code: 03

srm

ABSTRACT

✓ Accession Number:
@ 427
Hall, W.G., 1982, The leaching of organic carbon from in-situ spent shale: Ph.D. thesis, University of California, Berkeley, 148 p. plus appendices, (draft dated March 11, 1982).

Contact: Gloria Gill (copy)

Key Categories: LEACHING, IN-SITU, COMPUTER MODELS

Access Code: 011 Use Code: 01

This thesis presents the results of a laboratory study to develop a mathematical model of the variation in concentration of organic compounds with time and depth in a bed of in-situ spent shale. A series of batch and column experiments were conducted to leach spent shale obtained from the 10-ton simulated in-situ retort of the Laramie Energy Technology Center. The inorganic and organic content of the shale and leachate were characterized by electrical conductivity (EC) and total organic carbon (TOC). The primary solute of interest for model development, testing and verification was TOC.

These studies revealed that leaching takes place in three stages. Stage I leaching involves desorption of organic compounds from the surface of the spent shale while stages II and III involve transport of organic compounds from the interior of micropores in the spent shale. Rate-limiting mass transfer mechanisms within the solid and liquid phases were identified, and changes in mass transfer coefficients were evaluated with respect to changes in bed media size, approach velocity, and bed porosity. Mathematical models of Stages II and III mechanisms were developed, solved, and verified.

prm

ABSTRACT

✓ Accession Number:
@ 428
Hall, W.G., March 1980, Hydraulic calculations for a modified in-situ retort: Lawrence Berkeley Laboratory Rep. LBL-10431, 17 p.

Contact: Gloria Gill - LBL (copy)

Key Categories: COMPUTER MODELS, COLORADO, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 02

This report summarizes the results of preliminary calculations on water movement through an abandoned in situ retort. The report contains a brief description of the numerical model used and the aquifer-retort system evaluated. The model was used to analyze several cases involving different physical and geohydrological parameters. The effect of various vertical and horizontal permeabilities was studied. A low permeability cap rock to retard movement of leachate away from a retort was evaluated.

Pages
50

ABSTRACT

Accession Number:
@ 429
Hall, W.G., Selleck, R.E., and Thomas, J.F., March 1981, A mathematical model for leaching of organic carbon from in-situ retorted oil shale: in Oil shale and coal research, Energy and Environment Division Annual Report 1980, Lawrence Berkeley Laboratory Rep. LBL-11989, (Revised), p. 8-53.

Contact: Gloria Gill - LBL (copy)

Key Categories: LEACHING, IN-SITU

Access Code: 011 Use Code: 02

The report summarizes progress on the development of a mathematical model that describes the leaching of organic carbon from in-situ spent shale. The article presents the mass transport equations under consideration and describes the results of several batch and column leaching experiments designed to evaluate the proposed model.

ABSTRACT

Accession Number:
@ 430
Hamblin, L.S., and Gates, J.S., 1981, Water resource studies in Utah, July 1, 1980, to June 30, 1981: U.S. Geological Survey Open-File Report 81-903, 50 p.

Contact: USGS - Salt Lake City (copy)

Key Categories: UTAH, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, BIBLIOGRAPHY

Access Code: 011 Use Code: 01

This report summarizes progress on water-resources studies in Utah by the U.S. Geological Survey during the period July 1, 1980, to June 30, 1981. The report lists the following information for all current projects: title, cooperating agencies, staff, period of project, objectives, approach, progress, plans for next year, and reports.

ABSTRACT

Accession Number:
@ 431
Hansen, D.C., Nov. 1976, Water available for energy--Upper Colorado River basin: Journal Water Resources Planning and Management Div., American Society of Civil Engineers, v. 102, no. WRZ, p. 341-348.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN, WATER LAW, PRESENT WATER USE

Access Code: 011 Use Code: 03

This article briefly overviews the compacts and treaties governing the Colorado River, and it summarizes present depletions, main stem reservoir unconsumed water, committed water, and water available for future developments. Legal restraints to future development, including state water laws and Indian water rights, are explained, and alternative sources of water, including purchase of existing rights within the area, reevaluation of presently committed projects, and weather modifications, are discussed.

ABSTRACT

Accession Number:
@ 432
Hansen, R.D., Fullerton, H.H., Bishop, A.B., and Hughes, T.C., 1979, Historical and projected municipal and industrial water usage in Utah 1960-2020: Utah Water Research Laboratory Rep. UWRL/P-79/02, 59 p.

Contact: Utah State University Library (loan)

Key Categories: PRESENT WATER USE, UTAH

Access Code: 011 Use Code: 01

This publication reports the results of a municipal and industrial water use inventory. Data reported covers the period 1960 through 1976. Time series information is aggregated from municipal and industrial system level to county and state totals. Total municipal and industrial withdrawals are divided between surface and groundwater sources.

Yearly per capita withdrawal rates are estimated for 50 Utah municipalities and for each of Utah's 29 counties. Per capita withdrawal rates range from a high of over 400 gallons per capita per day (gcd) in the communities of Delta, Fillmore, Hyrum, Logan, and Morgan to a low of 100 gcd in Bountiful, Washington Terrace, Centerville, and South Ogden. A three year average (1974, 1975, and 1976) of Utah's per capita withdrawal rate is 262 gcd. Also reported are return flow rates for 13 Utah waste treatment facilities.

Withdrawal and return flow rates are also reported for Utah's major water using industries. These rates are reported in gallons per employee per day (or gallons per unit of output).

The publication also discusses methodologies for projecting municipal and industrial usage in Utah to the year 2020. Also reported are population projections for multicounty districts, counties and major cities by ten year intervals from 1960-2020.

ABSTRACT

Accession Number:
@ 433
Harbert H.P., III, and Berg, W.A., Feb 1978, Vegetative stabilization of spent oil shales: vegetation, moisture, salinity, and runoff, 1973-1976: Rep. EPA-600/7-78-021, 169 p.

Contact: Ed Bates (copy)

Key Categories: LEACHING, SURFACE,

Access Code: 011 Use Code: 01

Disposal of massive amounts of spent shale will be required if an oil shale industry using surface retorting is developed. Field studies were initiated in 1973 on two types of spent oil shale--coarse-textured (USBM), and fine-textured (TOSCO). The objectives of these studies were to investigate surface stability of and salt movement in spent shales and spent shales covered with soil after vegetation has been established by intensive treatment and then left under natural precipitation conditions. The plots were established at low-elevation (1,700 m) and high-elevation (2,220 m) study sites in northwestern Colorado.

A good cover of native species was established on all plots by leaching, N and P fertilization, seeding, mulching, and irrigation. High levels of Mo were found in plants grown in the spent shales compared to plants grown in soil. Resalinization occurred following leaching of the TOSCO spent shale. The greatest runoff was from the TOSCO spent shale. Runoff was moderately to highly saline.

ABSTRACT

Accession Number:
@ 434
Harbert, H.P., III, Berg, W.A., and McWhorter, D.B., Aug. 1979, Lysimeter study on the disposal of Paraho retorted oil shale, final report July 1975 - July 1978: Rep. EPA-600/7-79-188, 183 p.

Contact: Ed Bates (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 01

This study used lysimeters to develop both a low-elevation (dry site) and a high-elevation (moist site) disposal scheme for Paraho (direct-heated) retorted shale. The objectives were to investigate: (1) vegatative stabilization of the surface of Paraho retorted shale and retorted shale covered with various soil depths; and (2) water and salt movement through both uncompacted and compacted Paraho retorted shale. The lysimeters were constructed in western Colorado in 1976 and filled in March 1977. Only a sparse vegetation cover (5% to 15%) was established on retorted shale following fertilization, mulching and irrigation. In contrast, adequate plant cover (55% to 85%) was established on the soil cover over retorted shale and on soil control treatment areas. Water balance calculations and drainage below the compacted zone indicated that water had moved into and through the compacted zone in the leached treatment areas. Further study is needed on the permeability of the compacted shale.

ABSTRACT

Accession Number:
@ 435
Harding, B.L., Linsteat, K.D., Bennett, E.R., and Poulson, R.E., 1977, Removal of ammonia and alkalinity from oil shale retort waters by use of weak acid cation exchange resins: in Proceedings of the Second Pacific Chemical Engineering Congress, v. I, American Institute of Chemical Engineers, New York, New York, p. 442.

Contact: AIChE (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

Water produced as a by product during in-situ and modified in-situ retorting of oil shale was characterized and found to contain 3-5% inorganic solids, the majority of which are comprised by the ammonium and bicarbonate (alkalinity) ions. The potential for removal and recovery of ammonia from retort waters with weak acid cation exchange resins was investigated. In the first stage of the work, several different weak acid resins were screened on a bench scale basis to identify those most effective for this application. Following initial resin screening, more detailed studies were undertaken to develop information concerning the resin performance in treating retort waters. Data on capacities, rates of exchange, resin fouling and regeneration were developed and presented. Regeneration with dissolved CO_2 gas was found to be crucial to the feasibility of the process and was demonstrated in bench scale.

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ABSTRACT

√ Accession Number:
@ 436
Harding, B., Linstedt, K.D., Bennett, E.R., and Poulson, R.E., 1978, Study evaluates treatments for oil shale retort water: Industrial Wastes, v. 24, no. 5, p. 28-33.

Contact: Dick Poulson (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

This study characterized a process water from the Laramie Energy Technology Center 150-ton simulated in-situ retort. It also screened, in preliminary laboratory studies, a number of potential processes that may be used to treat the water, including activated carbon and macroreticular resins.

ABSTRACT

Accession Number:
@ 437
Harding, J.W., 1981, Requirements analysis for the water use and needs inventory system: prepared by CACI, Inc. - Federal for Bureau of Land Management.

Contact: BLM - Cheyenne (loan)

Key Categories: COLORADO, UTAH, WYOMING, WATER LAW

Access Code: 152 Use Code: 03

In the absence of a national computer system development effort to satisfy the requirement for water rights data, each of the BLM State offices has undertaken an independent effort to organize this data. The result of these independent development efforts has been great diversity in the types of systems developed.

The purpose of this study was to identify the magnitude of the water data problem associated with water rights claims and adjudications, to determine the functional requirements of the water data, and to present preliminary recommendations and considerations for the development of a Bureau computerized water data management system.

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ABSTRACT

√ Accession Number:
@ 438
Harline, O.L., and others, 1963, Use of water for municipal purposes--Utah counties, 1960-61: Utah University, Bur. Econ. and Business Research.

Contact: Utah University (copy)

Key Categories: PRESENT WATER USE, UTAH

Access Code: 002 Use Code: 03

What quantities of water are presently being used in Utah? What factors affect its demand? What will the future water requirements be? This study was designed to help answer some of these vital questions--specifically what quantity of water is currently being used in Utah's 29 counties for municipal and industrial purposes. Although this might appear to be a relatively simple question very little accurate and complete information is available. Even this study was not able to obtain many of the facts and answers it sought. Nevertheless, it is believed the assembled data presented herewith represent an important beginning.

1103

ABSTRACT

Accession Number:
@ 438.1
Harper, K.T., 1974, Fossil fuels and power generation in the Colorado River basin: in Environmental management in the Colorado River basin, Oct. 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, p. 164-173.

Contact: Utah State University Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 02

The magnitude of any environmental impact on the Colorado River basin will depend upon the size of the industry, attention given impact mitigating practices and unforeseen technological advances. Studies are necessary if these energy resources are to be exploited in a manner compatible with the environment. Better methods of strip mining and of land rehabilitation must be found. More thought should be given to the economic and social change inherent in the eventual abandonment of the stripmine-powerplant complexes. There is a real need for an accurate assessment of the actual cost of pollution controls now being forced on the power industry. These costs are probably more than consumers are actually willing to pay for the results derived.

ABSTRACT

Accession Number:
@ 439
Harrington, W., Abbey, D., and Sawyer, J.W., Jr., 1977, The electric power and synthetic fuels industry in the Southwest: in Production and environmental control technologies: Resources for the Future, Washington, D.C., Rep. PB-273847, 229 p.

Contact: NTIS (copy)

Key Categories: COLORADO, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 03

This report is concerned with the technologies most likely to be employed in the development of the vast coal and oil shale resources that underlie the arid and mountainous lands of the American Southwest. These technologies--electric power production, gasification and liquefaction of coal, and liquid fuels production from oil shale--evoke a concern with the potential environmental impacts, particularly those relating to water consumption and the discharge of residuals, and with the extent of which these impacts can be mitigated by the application of control technology. This document focuses on: (1) the chemistry, reserves, and production of coal; (2) technologies for fossil fuels-electric power production, energy transportation, synthetic gas, snycrude from coal, and the oil shale industry; (3) control technologies: (4) cooling system functions; and (5) the changing energy picture in the Southwest.

ABSTRACT

Accession Number:
@ 440
Hawkins, R.H., Gifford, G.F., and Jurinak, J.J., Oct. 1977, Effects of land processes on the salinity of the Upper Colorado River basin: final project report by Utah State University to Bureau of Land Management, 196 p.

Contact: BLM - Cheyenne (loan)

Key Categories: COLORADO, UTAH, WYOMING, SALINITY

Access Code: 152 Use Code: 02

This report summarizes three years of research on salt pickup and transport mechanisms and potential control alternatives. The purposes of this study were to determine: (1) the vegetative influence on salt movement in the hydrologic cycle; (2) the role of overland flow on salt movement for selected land vegetative types; (3) the relative magnitude of surface erosion from overland flow for selected land and vegetative types; and (4) the relative worth of selected treatments on control of salt movement in the hydrologic cycle. The Price River basin was selected for the study area because it is one of the major sources of salinity to the Colorado River and it has both climate and vegetation typical of the Upper Colorado River basin.

√

1104

ABSTRACT

Accession Number:
@ 440.1
Haycock, E.B., and others, 1970, Interim report on the state water plan: Utah Dept. of Natural Resources, Staff Report No. 6.

Contact: BLM-Vernal (loan)

Key Categories: AVAILABLE WATER BY BASIN , UTAH

Access Code: 112 Use Code: 03

As a step toward the formulation of a State Water Plan, this report reviews the broad alternative approaches open to the State of Utah for the further development and management of the State's water resources to meet the growing needs of the future. Since the results of investigations initiated during the past few years are only now beginning to become available, much of the data and its interpretation presented herein are approximations and subject to further refinement. The data, however, are indicative of the State's opportunities for meeting its water needs and the difficulties it will face in doing so. Other, more detailed reports will be issued as the studies progress.

ABSTRACT

Accession Number:
@ 441
Hedman, E.R., Moore, D.O., and Livingston, R.K., May 1972, Selected streamflow characteristics as related to channel geometry of perennial streams in Colorado: U.S. Geological Survey Open-File Report, 14 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

The mean annual runoff and peak discharges having selected recurrence intervals have been related to the width and average depth of cross sections between channel and point bars for 53 gaged sites on perennial streams in the mountain region of Colorado. These relations and measures of channel dimensions can be used to estimate streamflow characteristics for ungaged streams in the Colorado mountain region. The standard error of estimate is 18.3 percent for the relation with mean annual runoff, and ranges from about 30 percent to 45 percent for the relations with peak discharges having recurrence intervals of 2, 5, 10, 25, and 50 years. The standard error of estimate generally increased with the recurrence interval for peak discharges.

ABSTRACT

Accession Number:
@ 441.1
Heerman, D.F., Finkner, M.D., and Hiler, E.A., Dec. 1971, Probability of sequences of wet and dry days for eleven western states and Texas: Colorado State University Experiment Station Technical Bulletin 117, in cooperation with Agriculture Research Service, U.S. Dept of Agriculture and National Weather Service, U.S. Dept. of Commerce, A Western Regional Research Publication, 303 p.

Contact: Bulletin Room (loan)

Key Categories: COLORADO, WYOMING, UTAH, CLIMATE

Access Code: 011 Use Code: 02

Although there is no accurate way to make seasonal or annual precipitation forecasts, some insight into precipitation conditions can be obtained by examining past weather records. This bulletin represents an attempt to describe wet and dry sequences for the Western United States. Predictions are based on the assumption that these sequences will be the same in the future as they were during the 30-year period from 1931 to 1960. A previous publication considered probability of selected precipitation amounts in the Western United States (Gifford and other 1967; Abstract No. 418).

The tables presented in this bulletin can be used to find the probability of particular sequences of wet and dry days. The probability data in the tables are daily averages computed from weekly data. Stations included in oil shale regions include Rifle, Colorado; Vernal and Duchesne, Utah; and Green River, Wyoming.

≠ On-line Accession No. B00418).

✓

1106

ABSTRACT

Accession Number:
@ 441.2
Heimes, F.J., Moore, G.K., Steele, T.D., Oct. 1978, Preliminary application of LANDSAT images and aerial photography for determining land-use, geologic and hydrologic characteristics: Yampa River basin, Colorado and Wyoming: U.S. Geological Survey Water Resources Investigations, p. 78-96.

Contact: Public Inquiries Office (copy)

Key Categories: COLORADO, WYOMING, CLIMATE, ENVIRONMENTAL

Access Code: 002 Use Code: 02

The purpose of this study was to determine the potential of selected remote-sensing applications for providing some of these timely regional-level data which could be used in conjunction with other data collected by conventional methods. Landsat (land satellite) images and 1:100,000-scale color and color-infrared aerial photographs were used in the following applications: (1) regional land-use classification, (2) lineament mapping, and (3) aerial snow-cover mapping. The color and color-infrared aerial photographs were used for estimating turbidity in selected streams in the basin.

The investigations conducted using these four applications were designed as preliminary evaluations of the feasibility of these approaches and were not oriented toward the development of operational procedures. However, it is hoped that the results from this and subsequent studies will eventually lead to operational techniques using remote-sensing technology. Such techniques would facilitate the rapid collection and analysis of some of the data required for efficient allocation of resources on a regional basis.

This study was conducted as part of the Yampa River basin assessment (Steele and others, 1976). The basin-assessment project is a 2 1/2 year program designed to determine the availability and quality of the water resources and to evaluate the potential environmental and socioeconomic impacts of coal-resource development within the basin.

ABSTRACT

Accession Number:
@ 442
William Heley Engineering, July 1976, Moisture-level investigation of the Colony spent shale disposal embankment, Parachute Creek, Garfield County, Colorado: Report prepared for the Oil Shale Corporation, Grand Junction, CO, 36 p. plus appendices.

Contact: none

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 02

In April, 1976, the Colony Development Operation spent shale disposal embankment was sampled to determine its interior moisture distribution. Four holes were driven completely through the embankment section and continuous samples were taken. Laboratory testing for moisture contents at two inch vertical intervals revealed an abruptly varying moisture profile with no consistent patterns. Three holes did exhibit greater moisture near the bottom, but the maximum value was within the optimum compaction moisture range as determined by laboratory testing procedures and was below saturation. Specific conductance values did not show leachate concentration in the wetter zones. Underlying talus material was much lower in moisture. The data parallels similar variation in placement moisture and suggests little or no movement of water in the completed embankment.

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ABSTRACT

✓Accession Number:
@ 443
Hendricks, D.W., and Ward, J.C., 1976, Environmental analysis of an oil shale industry in the Upper Colorado Region: in Chpt. 11 of Yen, T.F., and Chilingarian, G.V., New York, Elsevier Scientific Publishing Co. Oil Shale.

Contact: Elsevier Scientific Publishing (copy)

Key Categories: ENVIRONMENTAL, COLORADO, UTAH, WYOMING

Access Code: 000 Use Code: 02

√

ABSTRACT

√ Accession Number:
@ 444
Hennig, R.A., and Olson, J.B., 1976, Comment-the Colorado River salinity problem -- old approaches to a new issue: in Land and Water Law Review, University of Wyoming, v. XI, no. 2, p. 459-480.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, WATER LAW

Access Code: 002 Use Code: 03

This Comment briefly surveys present and planned salinity control programs on the Colorado River with a view to identifying whether or not past patterns of policymaking and problem-solving evidenced with respect to development and allocation of the river are being carried over into the attempted management of the salinity problem. Emphasis is placed on identifying implications which may flow from the manner in which the salinity problem is being addressed, particularly in the area of federal-state relations.

ABSTRACT

Accession Number:
@ 445
Herbert, L.R., and others, 1981, Groundwater conditions in Utah, spring of 1981: Utah Dept. of Natural Resources and Energy, Cooperative-Investigations Report No. 21, 75 p.

Contact: Utah Division of Water Resources (copy)
USGS - Salt Lake City (copy)

Key Categories: GROUNDWATER QUANTITY, UTAH

Access Code: 011 Use Code: 02

This is the eighteenth in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow.

The report includes individual discussion of selected major areas of groundwater withdrawal in the State for the calendar year 1980. Water-level fluctuations, however, are described for the period spring 1980 to spring 1981.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-80. Other information that encompasses the study area is combined with data from other parts of the State.

ABSTRACT

Accession Number:
@ 446
Herbert, L.R., and others, 1980, Groundwater conditions in Utah, spring of 1980: Utah Dept. of Natural Resources, Cooperative Investigations Report No. 19, 72 p.

Contact: Utah Division of Water Resources (copy)
USGS - Salt Lake City (copy)

Key Categories: UTAH, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 03

This is the seventeenth in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow.

The report includes individual discussions of selected major areas of groundwater withdrawals in the State for the calendar year 1979. Water-level fluctuations, however, are described for the period spring 1979 to spring 1980.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-79. Other information that encompasses the study area is combined with data from other parts of the State.

ABSTRACT

Accession Number:
@ 447
Herron, J.T., Berg, W.A., and Herbert, H.P., III, Jan. 1980, Vegetation and lysimeter studies on decarbonized oil shale: Colorado State University Experiment Station Technical Bulletin 136, 110 p.

Contact: Bulletin Room (copy)

Key Categories: RECLAMATION, LEACHING, SURFACE

Access Code: 011 Use Code: 01

This report summarizes the results of a lysimeter study using Union SGR spent shale. The purpose of the study was to evaluate the feasibility of vegetative stabilization of bare and soil-covered spent shale, to study the movement of salt in spent shales with various treatments, and to investigate the quality and quantity of surface runoff and percolation from bare and soil-covered spent shale compared to soil controls. These studies were conducted on experimental plots located in the Parachute Creek Valley of western Colorado.

1107

ABSTRACT

Accession Number:
@ 447.1
Hersman, L.E., and Klein, D.A., Oct. 1979, Retorted oil shale effects on soil microbiological characteristics: Journal of Environmental Quality, v. 8, no. 4, 520-524 p.

Contact: Don Klein (copy)

Key Categories: SURFACE, RECLAMATION

Access Code: 002 Use Code: 02

The effects of retorted oil shale additions on the microbiological characteristics of surface soils were investigated in a laboratory study to evaluate possible effects of mixing of soils and retorted shales which might occur as a part of revegetation programs in areas disturbed by oil shale processing. Soils were mixed with retorted oil shale at 5, 10, and 25% addition levels, and compared with normal soil and retorted shale over a 2.5-mo. period, with evaluation of microbiological parameters carried out at 2-week intervals. With retorted shale present at up to 10% by weight, no negative effects on oxygen uptake or on actinomycete and bacterial populations were noted, while significant reductions of nitrogen fixation rates, as measured by acetylene reduction, and of dehydrogenase activity, fungal populations, radioactive glucose mineralization, and ATP concentrations occurred, with nitrogen fixation being most affected by shale material. These studies suggest that nonsymbiotic nitrogen fixation in surface soils may be especially sensitive to the presence of retorted oil shale. It would appear necessary to assure that sufficient surface soil is used to cover retorted oil shales to allow development and functioning of a diverse vegetation-microbiological community in such a way that physical mixing or movement of water-soluble retorted oil shale constituents into this surface soil layer would be minimized.

1108

ABSTRACT

Accession Number:
@ 447.2
Hibbert, A.R., 1977, Potential for augmenting flow of the Colorado
River by vegetation management: in Proceedings, 21st Annual Arizona
Watershed symposium, Nov. 1, 1977, Tucson, Arizona, Arizona Water
Commission report no. 10, p. 16-21.

Contact: Arizona Water Commission (loan)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 02

Building on the acknowledge premise that streamflow in the Colorado River basin will be insufficient to meet all future demands anticipated from rapid growth in the region and the requirements of energy development, this study seeks to set forth some theoretical watershed management practices that might reduce evaporative loss and thus icrease water yield in the basin. Water yield response to various treatment practices was determined for 11 vegetation types (excluding phreatophytes) on lands in all ownerships in both upper and lower basins, occupying some 76 million acres, or one-half the total basin. Results of such trials indicate that one-half million acre-feet of extra water could be obtained from the upper basin by commiting up to 22% of each vegetation type except aspen forest by 80-year rotation clearcut harvest in patches: in the lower basin, more extensive treatments would be required to generate a quarter of a million acre-feet of extra water. Disregarded in these choices are knowledge of availability of treatable acreage and economic feasibility, whereas in actual practice economic factors will strongly influence priorities of treatment, as will the complex and difficult matter of public acceptance of water improvement theories.

ABSTRACT

Accession Number:
@ 448
Hicks, R.E., and Liang, L., Jan. 1981, A study of reverse osmosis for treating oil shale in-situ wastewaters: final report prepared for U.S. Dept. of Energy, Laramie Energy Technology Center, Laramie, Wyoming by Water Purification Associates, Cambridge, Massachusetts, Rep. DOE/LC/10089-5, 144 p.

Contact: Harris Gold (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

The results of a study to determine the feasibility of using reverse osmosis for the treatment of the three major wastewater streams evolved during modified in-situ oil shale processing: gas condensate, retort water and excess mine drainage water, are presented in this report. Data was obtained from laboratory tests on real wastewaters treated with composite reverse osmosis membranes. It was found that reverse osmosis can be used to treat retort waters to a quality suitable for reuse within the plant while it can be used to treat excess mine drainage waters for discharge to a receiving stream. Furthermore, although reverse osmosis is also a feasible process for the treatment of gas condensate, a better treatment appears to be steam stripping which alone can produce a water of a quality suitable for plant reuse. The annual operating costs of treating mine drainage waters range from $2.00 to $2.30 per 1000 gallons of permeate while the costs of treating retort waters range from $2.70 to $2.90 per 1000 gallons of permeate, exclusive of the costs of concentrate disposal. The major uncertainty in the use of reverse osmosis for treating oil shale wastewaters is membrane lifetime. Recommendations are made for a field test program to determine the long term susceptibility of composite membranes to fouling and/or degradation.

ABSTRACT

Accession Number:
@ 449
Hicks, R.E., and Probstein, R.F., 1980, Water management and in-situ oil shale processing: in AIChE Symposium Series No. 197, v. 76, p. 225-240.

Contact: Harris Gold (copy)

Key Categories: PROCESS WATER USE, SURFACE, IN-SITU, EFFLUENTS

Access Code: 011 Use Code: 02

Water needs and wastewater production rates were determined for two surface retorting (TOSCO II and Paraho Direct) and a modified in-situ retorting process and the data used to develop water management schemes for commercial-scale plants. Water balances are presented for each process.

The treatment and disposal of process condensate and mine waters are also discussed. Research on dissolved gas and organics removal is reviewed and evaluated, and the possible use of contaminated water in cooling towers is discussed.

This paper summarizes more detailed analyses which are presented in Nevens and others, 1979 (Abstract No. 615).

ABSTRACT

Accession Number:
@ 450
Hicks, R.E., and Wei, I.W., Dec. 1980, A study of aerobic oxidation and allied treatments for upgrading in-situ retort waters: Final report prepared for U.S. Dept. of Energy, Laramie Energy Technology Center, Laramie, Wyoming by Water Purification Associates, Cambridge, Massachusetts, Rep. DOE/LC10097-1, 229 p.

Contact: Harris Gold (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

This study concerns the treatment of retort water from a modified in-situ shale retort. The water contains organic and inorganic contamination. An oil water separator was designed but tests were not made and are recommended. A steam stripper for ammonia was designed. A thorough experimental investigation of biological oxidation was made. Experiments were made on air and oxygen activated sludge with and without the addition of powdered activated carbon, on a rotating biological contactor and on sequenced equipment. The BOD (initially 4,000 mg/l) could be 90% removed from undiluted wastewater preferably using oxygen activated sludge. COD (initially 10,000 mg/l) was not removed in excess of BOD unless carbon was used. The sequence RBC-PAC-AS removed 85% of the BOD and 66% of the COD but is expensive. Solvent extraction and resin adsorption proved unsatisfactory as follow-on treatments to biological treatment. Activated carbon is satisfactory but expensive. Reverse osmosis proved an excellent alternative to biological oxidation and a separate study, not reported here, was made. Tests on the alternative of raising dirty steam from untreated retort matter were strongly recommended.

/1109

ABSTRACT

Accession Number:
@ 450.1
Hicks, R.E., and others, 1980, Wastewater treatment and management at oil shale plants: in Proceedings of 13th Oil Shale Symposium, Colorado School of Mines Press, Golden, Colorado, p. 321-334

Contact: Harris Gold (copy)
Colorado School of Mining (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

Laboratory tests have shown that the major wastewater streams produced during oil shale retorting can in principle be treated to a quality suitable for reuse within the plant. The wastewater stream condensed from the retort gases, here called the gas condensate, contains primarily dissolved gases (NH_3, CO_2 and some H_2S) and organics as contaminants. In batch stripping tests it was found that the organics, which may be present at concentrations of up to 5,000 mg/l measured as COD, are volatile and can be stripped along with the ammonia down to about 500 mg/l COD. Retort waters, or wastewater streams that condense within the retort, leach out considerable quantities of inorganic salts and the dissolved organics, present in concentrations of 4,000 mg/l TOC or more, are less volatile than those in gas condensates. In fact bench scale stripping of retort waters removed less than 20% of the organics, and it was further found that biological oxidation or resin/carbon adsorption steps do not remove more than about 50% of the remaining organics. These latter processes also suffer from the disadvantage that an additional treatment step is required to remove the inorganic salts. Reverse osmosis, however, does remove the inorganics and it was found that about 95% of the organics could be simultaneously removed by modern composite membranes at elevated pH. Thus a steam stripping treatment is sufficient to produce a water suitable for say cooling tower makeup from the gas condensate, while in the case of the retort waters an additional reverse osmosis step produces a water suitable for intermediate quality water needs within the plant.

Mine drainage waters will be produced at some oil shale plant sites. These waters contain from one to several thousand mg/l inorganic salts (mainly sodium bicarbonate) that can be removed by reverse osmosis. Plant water balances based on material balance calculations for both surface and in situ operations have shown that while there are sufficient water requirements for complete consumption of the treated gas condensate and retort water streams, much of the mine drainage waters will have to be disposed elsewhere. If discharged to a river, additional treatment to reduce boron and phenol to within permit limits may be required.

Water management schemes based on material balance calculations for several oil shale processes are shown together with treatment trains for gas condensate, retort water and mine drainage water streams. Design details and costs for reverse osmosis, biological oxidation and ammonia stripping systems are presented.

ABSTRACT

Accession Number:
√ @ 451
Higgins, T.E., Sept. 1981, Coagulation of oil shale retort waters with spent shale and metal salts: report prepared by Arizona State University, Tempe, Arizona for Laramie Energy Technology Center, Laramie, Wyoming, 36 p.

Contact: Dick Poulson (copy)

Key Categories: EFFLUENTS, SURFACE, IN-SITU

Access Code: 000 Use Code: 02

1110

ABSTRACT

Accession Number:
@ 451.1
Hill, R.W., Huber, A.L., Isrealsen, E.K., and Riley, J.P., Oct. 1972,
A self-verifying hybrid computer model of river-basin hydrology:
Water Resources Bulletin, v. 8, no. 5, p. 909-921.

Contact: Denver Public Library (loan)

Key Categories: UTAH, COMPUTER MODELS, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

The downstream consequences resulting from changes at specific locations within a hydrologic system were studied by hybrid computer simulation of the hydrologic system. Modeling concepts are based upon the development of basic relationships which describe the various hydrologic processes. Within a system these relationships are linked by the continuity-of-mass principle. Spatial resolution is achieved by considering the modeled areas as a series of subbasins. The time increment adopted for the model is one month, so that time varying quantities are expressed in terms of mean monthly values. The model is general in nature and is applied through a programmed verification procedure whereby model coefficients are evaluated for the particular system. In this study the model was applied to the Bear River basin of western Wyoming, southern Idaho, and northern Utah. Comparisons between observed and computed outflow hydrographs show good agreement.

ABSTRACT

Accession Number:
@ 452
Hillhouse, R.A., 1968, Comment - the federal reserved water doctrine--application to the problem of water for oil shale development: in Land and Water Law Review, University of Wyoming, v. III, no. 1, p.75-102.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, WATER LAW

Access Code: 002 Use Code: 03

This article is an attempt to delineate the legal aspects of, and economic effects related to, the possible application of the reservation doctrine to the problem of acquiring water for oil shale development. An attempt will be made to demonstrate that while water should be made available to facilitate the extraction of oil from shale it should not become available unless those who have invested in reliance upon state appropriations are compensated for their losses.

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ABSTRACT

Accession Number:
@ 452.1
Hines, A.L., Aug. 1980, The role of spent shale in oil shale processing and the management of environmental residues: U.S. DOE Rep. DOE/LETC/10020-1, 141 p.

Contact: Dick Poulson (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

This report summarizes the results of research on the treatment of in situ retort water and on the use of spent shale to remove H_2S from oil shale offgases. The report presents the results of five separate research tasks. In the first task, a small, laboratory-scale retort was used to investigate the effect of retorting conditions on spent shale characteristics. Forty-eight runs were made, and the mineral composition, porosity and surface area of each was measured. In Task 2, the adsorption of H_2S on spent shale was studied. An adsorption model was developed, and diffusion coefficients and breakthrough curves were determined. In Task 3, hot gas stripping of retort water was studied using a "model" retort water. In Task 4, the removal of single-solute aliphatic acids from dilute aqueous solutions was studied using activated carbon as the adsorbent, and in Task 5, the multi-solute adsorption of aliphatic acids onto activated carbon was studied.

√ 1112

ABSTRACT

Accession Number:
@ 452.2
Hines, A.L., 1978, The role of spent shale in oil shale processing and the management of environmental residues: final technical report, Sept. 1976 - Dec. 1977: U.S. DOE Rep. TID-28586, 103 p.

Contact: NTIS (copy)
Dick Poulson (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 03

The program was divided into three major tasks: leaching of spent shale, the development of methods to treat water produced during retorting, and an investigation into the sorptive properties of spent shale. Under Task 1, retorting experiments were carried out on an oil shale with a richness of 19.9 gallons of oil per ton of shale. Chemical and x-ray analyses were carried out on spent shales that had been retorted at temperatures ranging from 300°C to 1,000°C. Retorting times of 2, 5, and 15 hours were also considered. A BET surface area analysis was made on spent shale samples which were retorted at temperatures ranging from 300 to 1,000° C for 2 hours. The maximum surface area of 4.6 m^2/g was found for shale that had been retorted at 700°C. As part of Task II, studies on the hot gas stripping of retort water were considered. In this portion of Task II, a hot gas stripping apparatus was designed and constructed, and CO_2 could be effectively removed from water by hot gas stripping. At a stripping temperature of 200° F and a stripping ratio of 40 SCF/gal, the ammonia concentration was reduced from 11,000 to 3.7 ppM and the bicarbonate concentration was reduced from 47,000 to 220 ppM. the second portion of Task II entailed studying the adsorption of phenol and benzoic acid onto the Rohm and Haas XAD-8 macroreticular resin. Binary adsorption studies of the above materials indicated that phenol was adsorbed onto hydrophobic sites whereas benzoic acid was adsorbed onto hydrophilic sites and onto the hydroxyl group of the phenol. Task III consisted of studying the adsorpiton of sulfur dioxide on spent shale in packed beds. The adsorption data were modeled by the Langmuir and Freundlich equations.

ABSTRACT

Accession Number:
@ 453
Hoffman, L., Noren, S.E., and Holt, E.C., March 1981, Environmental, operational and economic aspects of thirteen selected energy technologies: Rep. EPA-600/S&-80-173.

Contact: NTIS (copy)

Key Categories: ENVIRONMENTAL, SURFACE, IN-SITU

Access Code: 011 Use Code: 02

The report provides a review of 13 processes for generating energy or converting fuel to a more useful form. These processes are either already in commercial use or believed to be commercially viable and are undergoing intensive research and development. The processes are:

- conventional boiler (with steam turbine)
- diesel generator
- fluidized-bed combustion
- combined cycle systems
- low/medium-Btu gasification
- chemically active fluid bed (CAFB)
- indirect coal liquefaction
- high-Btu gasification
- surface oil shale processing
- in situ oil shale processing
- direct coal liquefaction
- fuel cells
- magnetohydrodynamics (MHD)

For each process discussed in this report, there are six major sections: overview; process description; applications; environmental considerations; performance and economics. The material is based on information obtained from available technical literature as well as from government and industry sources.

1113

ABSTRACT

Accession Number:
@ 453.1
Holburt, M.B., and Valantine, V.E., March 1972, Present and future salinity of the Colorado River: Journal of the Hydraulics Division, ASCE, v. 98, HY3, Paper 8769, p. 503-520.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY

Access Code: 002 Use Code: 03

Under the impact of continually increasing demands on the water supply of the Colorado River. The River's already high salinity would increase by at least 50% at the major diversion points along the lower Colorado River prior to the year 2000 unless salinity control measures are instituted. The Colorado River is a major source for the seven states of the Pacific southwest and projected economic growth in these states requires the nearly full utilization of the river's water by that date. Natural conditions of salinity are identified for the Colorado River basin. Salinity increase projections are based on consumptive use of water and the return of dissolved salts through the use of water for irrigation; and on out-of-basin diversions. Estimates of damages from increases in salinity are presented, together with suggestions for possible control measures.

1114

ABSTRACT

Accession Number:
@ 453.2
Holland, L.M., and Stafford, C.G., eds., 1981, The Los Alamos intergrated oil shale health and environmental program: A status report, Rep. LA-8665-SR, 102 p.

Contact: Marty Holland (copy)
NTIS (copy)

Key Categories: SURFACE, IN-SITU, EFFLUENTS, LEACHING

Access Code: 011 Use Code: 01

This report summarizes the Los Alamos Scientific Laboratory research activities addressing health and environmental concerns related to the developing U.S. oil shale industry. The report consists of a series of technical summary papers which overview the work of individual projects for the proceeding 12 month period. The report is organized by area of concern into the following sections: field studies, airborne effluents, oils, waters, and arsenic and nickel species of concern. Organic characterizations of Paraho retort water and the results of toxicity testing of effluents from the Occidental modified in situ, the Geokinetics true in situ, and the Paraho processes are presented.

1115

ABSTRACT

Accession Number:
@ 453.3
Holland, W.E., 1975, Mixing water and oil: the effect of prevailing water law doctrines on oil shale development: Denver Law Journal, v. 52, no. 3, p. 657-694.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, WATER LAW

Access Code: 002 Use Code: 02

The Colorado River compact, the Mexican water treaty, and the upper Colorado River basin compact artifically limit availability of water supplies in the oil shale areas. In addition ground waters and surface waters are considered public property and thus are subject to allocation through prior appropriation systems in the shale oil states. Consequently, water for production purposes can be acquired only by acquiring existing appropriation rights or by filing applications for unappropriated water.

ABSTRACT

Accession Number:
@ 454
Holmes, W.F., 1980, Results of test drilling for ground water in the southeastern Uinta basin, Utah and Colorado: U.S. Geological Survey Water-Resources Investigations 80-951, 90 p., plus plates

Contact: USGS - Salt Lake City (copy)

Key Categories: GROUNDWATER QUALITY, GROUNDWATER QUANTITY, UTAH

Access Code: 011 Use Code: 01

During 1974, the U.S. Geological Survey began a comprehensive hydrologic study of the oil-shale area in the southeastern Uinta Basin of Utah and Colorado. From 1976 to 1978, six deep test holes were drilled principally to obtain information about aquifers in the Green River Formation of Tertiary age. Information obtained from the drilling project includes description of lithologic samples from core and drill cuttings, temperature and geophysical logs, drilling logs, packer tests, aquifer (pumping and recovery) tests, and analyses of water samples.

Logs and analyses of water samples indicate the occurrence of two major aquifers. The "bird's-nest" aquifer was penetrated in two of the test holes and is apparently a major aquifer in the central part of the study area. This aquifer occurs about 400 feet above the Mahogany zone, an oil-shale bed in the Parachute Creek Member of the Green River Formation. A water sample collected during drilling indicated a dissolved-solids concentration of 9,870 milligrams per liter.

The Douglas Creek Member of the Green River Formation is a major freshwater aquifer in most of the study area, and it was penetrated in all six test holes. Water samples collected from this aquifer generally had dissolved-solids concentrations of less than 1,000 milligrams per liter. Values of transmissivity calculated for the Douglas Creek aquifer from hydrologic tests ranged from 16 to 170 feet squared per day. Estimates of storage coefficients ranged from about 2.5×10^{-4} to 7×10^{-4}.

ABSTRACT

✓Accession Number:
@ 455
Holtz, W.G., Dec. 1976, Disposal of retorted oil shale from the Paraho oil shale project: U.S. Bureau of Mines, NTIS PB-263 793.

Contact: NTIS (copy)

Key Categories: LEACHING, SURFACE, RECLAMATION

Access Code: 011 Use Code: 02

A project to demonstrate the feasibility of retorting oil shale by the Paraho vertical retort process was carried out at Anvil Points, Colo., during 1974-76. As part of the demonstration project, laboratory and field tests were performed to determine the physical and chemical properties of the retorted shale for use in the development of eventual full-scale disposal plans. The material which exists from the Paraho retort is classified as a nonplastic silty gravel by the Unified Soil Classification System. The particles have an apparent specific gravity averaging near 2.60 and a mass specific gravity averaging near 2.00. The material can be compacted by normal laboratory and field construction methods to about 90 to 100 pounds per cubic foot dry density depending upon the degree of compactive effort applied. The addition of moisture does not improve compactibility appreciably. When high compactive effort is applied the retorted shale is classed as impervious to waterflow. The compacted retorted shale exhibits shear strengths in the same order as those observed for silty gravel soils. If the compacted material is cured prior to strength testing considerable strength gain can be obtained from cementing action. The amount of cementing developed is dependent upon heat treatment and other operating modes of the retort. The report presents information on the compositon of leachates from Paraho spent shale and on spent shale disposal options.

ABSTRACT

Accession Number:
@ 456
Hood, J.W., 1977, Hydrologic evaluation of the Upper Duchesne River Valley, Duchesne County, Utah: Utah Dept. of Natural Resources, Technical Publication No. 57, 34 p. plus 2 plates.

Contact: Utah Division of Water Rights (copy)
USGS - Salt Lake City (copy)

Key Categories: UTAH, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, SPRINGS

Access Code: 002 Use Code: 01

The upper Duchesne River valley was studied during 1971-74 as part of an investigation of the northern Uinta Basin area, Utah and Colorado. The purpose of the study was to determine the relation of ground water to surface water, to estimate the quantity of ground water that moves to the Duchesne River, and to assess the probable effect of increased ground-water withdrawal on streamflow.

ABSTRACT

Accession Number:
@ 457
Hood, J.W., 1977, Hydrologic evaluation of Ashley Valley, northern Uinta basin area, Utah: Utah Dept. of Natural Resources, Technical Publication No. 54, 25 p. plus 1 plate.

Contact: Utah Division of Water Rights (copy)
USGS - Salt Lake City (copy)

Key Categories: UTAH, SURFACE WATER QUALITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

The water resources of the northern Uinta Basin, Utah and Colorado, were studied during 1971-74. Ashley Valley was evaluated in slightly greater detail than the general area, in order to assess the general relation of ground- and surface-water supplies.

This report describes the geology of the area. Groundwater source and movement, storage, well level fluctuations, and discharge are described, and chemical quality of water in Ashley Creek, Steinaker Reservoir and of groundwater in Ashley Valley are discussed and presented on the plate. Evapotranspiration in Ashley Valley is calculated for 1949-50 and 1970-72. The plate shows the altitude of the base of the valley fill of Quaternary age; extent, saturated thickness, and other hydraulic properties of this fill; altitude of water levels in wells, and chemical quality as noted above.

ABSTRACT

Accession Number:
@ 458
Hood, J.W., 1976, Characteristics of aquifers in the northern-Uinta basin area, Utah and Colorado: Utah Dept. of Natural Resources, Technical Publication No. 53, 71 p.

Contact: Utah Division of Water Rights (copy)
USGS - Salt Lake City (copy)

Key Categories: UTAH, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

This report presents a part of the results of an investigation of the hydrology of the northern Uinta Basin area. The purpose of the report is to summarize the hydraulic and geohydrologic characteristics of aquifers in the area. The investigation included field work during the period July 1971-June 1974 that involved an analysis of groundwater conditions and the relation of groundwater resources to geology, precipitation, streamflow. Records of data used in this report are listed by Hood, Mundorff, and Price, 1976 (Abstract No. 460).

The methods used to determine aquifer characteristics, i.e., pumping tests are described, and the resulting data are tabulated. This information is used to evaluate important aquifers in the area, including the glacial outwash and alluvium of Pleistocene age; Duchesne River and Unita Formations, Currant Creek Formation; Glen Canyon Sandstone; Weber Quartzite; and the rocks of Missippian age. Appendices provide additional details on the aquifers tests and tabulate specific information (depth, water bearing material, yield, drawdown, specific capacity, transmissivity) on a large number of wells. Plates show geology, location of selected wells, and transmissivity and hydraulic conductity of selected sites in the glacial outwash and alluvium of Pleistocene age and the Duchesne River and Uinta Formations.

√ 1116

ABSTRACT

Accession Number:
@ 458.1
Hood, J.W., Kimball, B.A., and Patterson, D.J., 1981, Regional aquifer systems analysis-mesozoic sandstone aquifers in the Upper Colorado River basin: in Water-resources studies in Utah, July 1, 1980 to June 30, 1981, U.S. Geological Survey Open-File Report 81-903, p. 50.

Contact: Jim Hood (status)

Key Categories: UTAH, COLORADO, WYOMING, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, COMPUTER MODELS

Access Code: 011 Use Code: 01

This study will be one in a series of national studies of regional aquifer systems that together will cover much of the United States. In the Upper Colorado River Basin, aquifers that are truly regional are a complex of thick sandstones of Jurassic and Triassic age and carbonate and sandstone aquifers of Mississippian and Permian age. This study will target the thick sandstones of the Mesozoic System and locally related aquifers of lesser extent. The study is intended to (1) provide a basin-wide data base; (2) define and quantify recharge, occurrence, movement, discharge, and quality of groundwater; (3) model the system(s) in order (a) to understand the natural (pre-development) flow and geochemical system(s) and (b) to evaluate or predict the effects of future development and differences in these effects due to various management strategies.

Computer simulation will be the main tool used to analyze the hydrogeologic regimen of the Mesozoic aquifers system. The results of prior spot, areal, and regional studies will be collected and combined, and basic data from those studies will be updated. Concurrently, a preliminary regional flow model(s) will be constructed in order to test provisional hypotheses and show areas where additional data are needed. Following will be a period of data collection, during which the model(s) will be updated as field data are obtained. Final analyses will incorporate consideration of the effects of development on the groundwater flow regimen and storage, on surface-water flow, and on possible water-quality changes that would accompany development. Results of the study will appear as a planning document, data report(s), model documentation, and a final interpretive report.

ABSTRACT

Accession Number:
@ 459
Hood, J.W., and Fields, F.K., 1978, Water resources of the northern Uinta basin area, Utah and Colorado, with special emphasis on ground-water supply: Utah Dept. of Natural Resources, Technical Publication No. 62, 75 p. plus 5 plates.

Contact: Utah Division of Water Rights (copy)
USGS - Salt Lake City (copy)

Key Categories: GROUNDWATER QUANTITY, GROUNDWATER QUALITY, AVAILABLE WATER BY BASIN, UTAH, PRESENT WATER USE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 01

This report presents results of an investigation of water resources of the northern Unita basin area. Field investigations were made during the period July 1971-June 1974. This report defines the quantity and quality of groundwater available in the study area for local use, transmountain diversion, and other. This report is similar to another in this bibiliography on hydrology of the southern Unita basin (Price and Miller, 1975; Abstract No. 641)

The physiography, geology, climate, vegetation, and water use in the basin are described. Surface water resources are described, including volume, and variability of stream flow and effects of reservoir operations; and pertinent data are tabulated or graphed. Groundwater recharge, occurrence, movement, storage, and discharge are described, and well level fluctuations and cumulative departures from average annual precipitation are graphed. The chemical quality of surface and groundwaters and their suitability for domestic, stock, and irrigation use are evaluated. The availability of water for future development, and the effect of groundwater withdrawal on streamflow are discussed. Plates show the location of wells and surface water stations used in this study, gaging sites with above- or below-average surface water yields, potentiometric-surface contours for parts of the Duchesne River and Unita Formations, and generalized chemical quality of groundwaters.

ABSTRACT

Accession Number:
@ 460
Hood, J.W., Mundorff, J.C., and Price, D., 1976, Selected hydrologic data, Uinta Basin area, Utah and Colorado: U.S. Geological Survey Basic Data Release No. 26, 321 p. plus plates.

Contact: USGS - Salt Lake City (copy)

Key Categories: SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, UTAH

Access Code: 011 Use Code: 01

This report presents consolidated listings of data selected for use in hydrologic studies in the Unita basin area through June 1974. The data are principally taken from three studies made during 1971-74 by the U.S. Geological Survey in cooperation with the Utah Department of Natural Resources, Division of Water Rights. Also incorporated in this report are data collected since 1935 by the U.S. Geological Survey and other organizations. This report is intended to make data conveniently available and to supplement interpretive reports that will be published separately. For some data sites, the volume of data is too great for complete inclusion here. For these sites, data summaries are provided, and for greater detail the reader is referred to the sources listed under selected references.

The report summarizes the following type of information: (1) well water levels and cumulative departures from average annual precipitation at nearby climatological stations: (2) monthly hydrographs for seven stations; (3) records of selected wells (location, owner, well depth, major aquifer, type of analyses, etc.); (4) records of selected springs; (5) records of selected petroleum-test wells: (6) well water level records; (7) chemical analyses of water from wells, springs, and surface water stations; and (8) records of streamflow stations (locations, drainage areas, period of record). The plates show the locations of wells, springs, petroleum-test wells, and surface-water data sites.

ABSTRACT

/ Accession Number:
@ 461
Hood, J.W., and others, 1966, Ground-water conditions in Utah, spring of 1966: Utah Water and Power Board, Cooperative-Investigations Report No. 4, 95 p.

Contact: USGS - Salt Lake City (loan)

Key Categories: GROUNDWATER QUANTITY, UTAH

Access Code: 112 Use Code: 03

This is the third in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Water and Power Board.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow. It also contains supplementary data that are related to groundwater use in some individual areas.

The report includes individual discussions of the most important areas of groundwater withdrawals in the State for the calendar year 1965. Water-level fluctuations, however, are described for the period spring 1965 to spring 1966.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-66. Other information that encompasses the study area is combined with data from other parts of the State.

1117

ABSTRACT

Accession Number:
@ 461.1
Hooper, D., and Schwarting, R., 1981 Utah water use data, public water supplies 1979: Utah Dept. of Natural Resources, Utah Water Use Rep. no. 2, 80 p.

Contact: Utah Division of Water Rights (copy)
USGS - Salt Lake City (copy)

Key Categories: UTAH, PRESENT WATER USE

Access Code: 011 Use Code: 01

This report presents data for public water suppliers in Utah during 1979. The data were collected through questionnaires mailed to the various public water suppliers. This publication is the second of a continuing series of reports on Utah water use.

The report is organized by county. The information included for each county includes diversions in gallons from surface waters, springs, and wells for each public water supplier responding to the questionnaire. The population served by each supplier and the reliability of the data are also indicated. County totals from each water source are included, and bar graphs of daily per capita withdrawal rates are presented for each supplier. Orientation maps which show the location of the suppliers and other pertinent water resources data are presented for most counties. Data are included for five suppliers in Duchesne County (Altamount, Duchesne, Myton, Neola, Roosevelt) and for six suppliers in Uintah County (Ballard, Jensen, Maeser, Ouray Park, Tridell-Lapoint, and Vernal-Ashley-Naples).

ABSTRACT

Accession Number:
@ 462
Hotchkiss, R.H., Israelsen, E.K., and Riley, J.P., Oct. 1980, Management of the hydrologic system in areas subject to coal mining activities: Utah Water Research Laboratory, Utah State University, Water Resources Planning Series UWRL/P-80/05, 84 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: SEDIMENT, SALINITY, SURFACE WATER QUANTITY, UTAH, ENVIRONMENTAL, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 02

The report examines the effects of present mining activities on the associated hydrologic system, and identifies specific mining procedures and management techniques which not only minimize negative hydrologic impacts of mining operations, but which also enhance the value of the hydrologic system in terms of existing and potential social uses. Thus, the results of the research contribute to the solution of present and future hydrologic problems (both quantity and quality) associated with coal mining in the western U.S. Emphasis is placed on sites which are representative of both existing and future coal mining areas.

The study discusses and evaluates the following topics with reference to coal mines in central Utah: (1) the potential for using underground coal mines to tap groundwater supplies, (2) the potential for using underground coal mines to reduce the salt load to the Colorado River, (3) opportunities for using abandoned coal mines to store water, (4) impact of subsurface mining on water resources, and (5) occurrence and controls for sedimentation.

ABSTRACT

Accession Number:
@ 463
Howard, C.S., 1955, Quality of water of the Colorado River, 1925-40:
U.S. Geological Survey Open-File Report, 103 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, UTAH, WYOMING, SURFACE WATER QUALITY

Access Code: 002 Use Code: 03

The study of the quality of water of the Colorado River and its tributaries has been a continuing one since 1925. The data so obtained have been useful in the planning and construction of dams and reservoirs, the utilization of the water within the basin, and in planning the economy of areas outside of the basin, partially or wholly dependent on the diversion or importation of water from the Colorado River or its tributaries. Much chemical quality data of the Colorado River and its tributaries collected during the period from 1925 to 1940 have not been published in detail.

The purpose of this report is to make available for consultation and ready reference those previously unpublished data collected for the period 1925 to 1940, mainly between 1930 and 1940. Included among these data are many detailed chemical analyses of composites of daily samples and single samples of the Colorado River and its main tributaries and less detailed analyses of many other samples. In a few instances, for continuity of the record, analyses are included that have been published in Survey reports. Discussions of the quality of water of the Colorado River basin either in published reports or in mimeograph form are available; therefore, this report will include only tabulated data.

ABSTRACT

Accession Number:
@ 464

Howe, C.W., Kreider, J.F., Udis, B., Hess, R.C., Orr, D.V., and Young, J.T., Sept. 1975, Integrated economic-hydrosalinity-air quality for oil shale and coal development in Colorado: Boulder, Colorado University, Economics Department, report to Colorado Energy Research Institute, 89 p.

Contact: University of Colorado Library (loan)

Key Categories: COLORADO, SALINITY

Access Code: 000 Use Code: 02

1118

ABSTRACT

Accession Number:
@ 464.1
Howe, C.W., and Orr, D.V., July 1973, Economic incentives for salinity reduction and water conservation in the Colorado River basin: Proceedings of the 15th annual western resources conference, University of Colorado, Boulder, CO.

Contact: University of Colorado Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, PRESENT WATER USE

Access Code: 002 Use Code: 03

The more recent emergence of huge potential energy-related demands for water simply increases consumptive uses and salinity problems. Such developments increase the imortance of finding additional steps in the upper basin for reducing salt and conserving water. The evaluation of alternative approaches to salinity and water quantity problems is considered, and economic incentives or disincentives are examined in light of their ability to induce water savings and salinity reduction. Concrete recommendations are made for a water rights purchase program which could greatly assist in the efficient reallocation of water and reduction of salinity. Preliminary estimates of the program's costs are made.

1119

ABSTRACT

Accession Number:
@ 464.2
Howe, C.W., Kreider, J.F., and Udis, B., Oct. 1972, An economic analysis of the pollution problems in the Colorado River basin: the upper main stem sub-basin: Rep. EDA-OER-74-308, 238 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS, SALINITY, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

To permit planners to test some environmental implication of alternative growth patterns for the upper main stem sub-basin of the Colorado River, a set of models relating economic activities to air and water demand and quality are developed. This interim report describes a model which has three components: (1) an input-output model of the sub-basin economy, (2) an air diffusion model projecting the airborne distribution of residuals over the region, and (3) a hydrologic-salinity model to trace the monthly surface and groundwater flows and salt flows through the system. Included in the analysis are the agriculture, forestry, mining, energy, manufacturing, tertiary industries, and contract construction aspects of the economy. Fortran computer programs for hydro-salinity, residuals generation and pollutant dispersion air in modeling the relationships between economic activities and environmental implications.

ABSTRACT

Accession Number:
@ 465
Hubbard, A.B., 1971, Method for reclaiming waste water from oil-shale processing: American Chemical Society, Div. Fuel Chem., Preprints, v. 16, no. 1, p. 21-25.

Contact: American Chemical Society (copy)

Key Categories: EFFLUENTS, IN-SITU, SURFACE

Access Code: 011 Use Code: 03

This article summarizes the results of research to remove organic and inorganic materials from retort waters from an aboveground and an in situ retorting process. Two treatment systems were investigated. The first consisted of lime coagulation, activated carbon absorption, cation exchange, and anion exchange. In the second method, the first two steps were reversed, i.e., the water was first treated by activated carbon absorption followed by lime coagulation. This paper presents removal efficiences for ammonium, sodium, carbonate, chloride, sulfate, and pH and discusses the results.

ABSTRACT

Accession Number:
@ 466
Hubbard, K.G., and Richardson, E.A., 1980, Storage-gage precipitation data for Utah through Oct. 1978: Climatology Office, Utah Dept. of Agriculture.

Contact: Utah Dept. of Agriculture (copy)

Key Categories: CLIMATE, UTAH

Access Code: 002 Use Code: 01

This publication presents a comprehensive summary of storage-gage precipitation data in Utah through October, 1978. Data were compiled from numerous sources for various periods of record. Most precipitation measurements presented in this report were obtained on a monthly basis.

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ABSTRACT

√ Accession Number:
@ 467
Hubbard, K.G., and Richardson, E.A., 1979, Tabulation and application of pan evaporation data for Utah through 1976: Utah Water Research Laboratory Rep. UWRL/A-79/02, 76 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: CLIMATE, UTAH

Access Code: 011 Use Code: 01

Monthly values of evaporation, wind movement and water temperatures are presented for all available stations in Utah. A brief review is given of factors which affect evaporation along with several examples how pan evaporation data are used. Data are tabulated for the following stations in or near the Utah oil shale basin: Manila, Flamming Gorge, Vernal, Ft. Duschene, Moon Lake, and Myton.

ABSTRACT

Accession Number:
@ 468
Huber, A.L., and others, 1981, Consumptive use and water requirements for Utah: Utah Water Research Laboratory report, Logan, Utah.

Contact: Leon Huber (status)

Key Categories: UTAH, PRESENT WATER USE

Access Code: 002 Use Code: 01

A previous UWRL study provided the Utah State Engineer consumptive use information reproduced by that office in Technical Publication No. 8, "Consumptive Use and Water Requirements for Utah," in 1967. This study sought to update those results by adding more recent data and using additional sorts of data. A better consumptive use map and tabulations of more recent information on other uses are provided. Potential consumptive use was calculated at points on a 2-mile square grid covering the entire state. A map showing potential consumptive use was constructed from the point data. Municipal, industrial, livestock and recreational use requirements were also estimated and tabulated. Municipal uses were estimated as annual rates and as peak monthly, daily, and instanteous demands.

The point consumptive uses estimates for the mapping were made combining information on air climatology with information on physiographic parameters at the ground. The Blaney-Criddle formula was used as modified by the Soil Conservation Service in their report "Irrigation Water Requirements," Technical Release No. 21. Data from all weather stations in Utah with 15 or more years of record were used to develop predictive equations for estimating mean July air temperature at the 700 mb level and combining this temperature data with surface parameters for estimating point consumptive use.

1120

ABSTRACT

Accession Number:
@ 468.1
Huber, A.L., Richardson, E.A., and Hubbard, K.G., 1981, Development of a hydrologic data bank for Utah: in Utah Water Research Laboratory Annual Report for 1981, General Series UWRL/G-81/02, p. 73.

Contact: Leon Huber (status)

Key Categories: UTAH, BIBLIOGRAPHY, CLIMATE

Access Code: 002 Use Code: 01

The long-term objective of this project is to develop a single data bank (stored on computer files for easy access) for indexing, storing, retrieving and performing routine analyses on data useful for water resources planning and management at all levels in the State of Utah. So far, magnetic tapes which contain daily climate data have been indexed. The index contains the starting and ending record number for each climate station. This information allowed the construction of a master index file which users can query with specific data needs. A call to the VAX computer at USU puts a user in touch with the INDEX program, which then prompts the caller with questions on the geographical location of the needed data, etc. At the end of the session the user can choose to extract the stations identified during the session or to save the information gained for future reference. Computer technology will allow most of the climatic data for Utah to be stored in readily accessible disk packs with room left for hydrologic data as well.

1121

ABSTRACT

Accession Number:
@ 468.2
Huber, A.L., and Narasimhan, V.A., 1976, Applying a hydro-salinity model to three subbasins within the Colorado River basin: in Clyde, C.G., Falkenborg, D.H., and Riley, J.P., eds., Colorado River basin modeling studies, Utah Water Research Laboratory, p. 443-455.

Contact: Utah Water Research Laboratory (copy)

Key Categories: UTAH, SALINITY, COMPUTER MODELS

Access Code: 01 Use Code: 02

The computer model (BASIM) was used to aid in evaluating the water quality salinity impacts of irrigation management levels. Three subbasins were selected for modeling purposes--the Palo Verde Irrigation District, California, the Grand Valley, Colorado, and Duchesne Basin of Utah The model computes various hydrologic quantities before the corresponding salt quantities are calculated. This is accomplished by determining concentrations of the flows, including the salt pickup, and computing the total salt flow from the basin. The model assumes that salt pickup from irrigation is proportional to the amount of percolating water. The model was calibrated using the observed data from the subbasin where sufficient record is available for the component flows. The results showed a close agreement between the predicted quantities and the observed data with respect to the quantity of flows; however, it did not show a corresponding agreement with respect to the concentrations of drain water. The disagreement is attributed to the simplifying assumption in representing the salt pickup.

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ABSTRACT

✓ Accession Number:
@ 469
Huffman, E.W.D., Jr., 1979, Isolation of organic materials from in situ oil shale retort water using macroreticular resins, ion exchange resins, and activated carbons: in Van Hall, C.E., ed., Measurement of organic pollutants in water and wastewater, ASTM STP 686, p. 275-290

Contact: ASTM (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

Organic materials in an oil shale retort water produced *in situ* were fractionated using macroreticular resins, ion exchange resins, and activated carbon Approximately 50 percent of the material was adsorbed on the macroreticular resin. Of the materials adsorbed on the macroreticular resin, 26 percent were basic, 36 percent were acidic, and 38 percent were of neutral character. Of materials passing through the resin, 21 percent were adsorbed on a cation exchange resin (basic), 58 percent were adsorbed on anion exchange resins (acidic), and 20 percent were not adsorbed (neutral). Activated carbon adsorbed quantities of material similar to those adsorbed by the ion exchangers if the sample was acidified before adsorption. Based on these fractionation experiments, a procedure to perform a preparative scale fractionation of an oil shale retort water produced *in situ* into representative organic compound classes has been developed. The four primary fractions isolated include hydrophobic bases, hydrophobic neutrals, carbon adsorbables, and nonadsorbables.

1122

ABSTRACT

Accession Number:
@ 469.1
Huffman, J.L., and Berry, M.P., July 1980, The allocation of water to instream flow, v. II: Colorado water resources management: final report to the Office of Water Research and Technology, 97 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WATER LAW, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 02

This report represented volume II of a five-volume report on the topic of water allocation to instream flows; the overall study also including the states of Idaho (volume III), Montana (Volume IV), and Washington (volume V). The overall study examined the impact of alternative institutional approaches for the allocation of water to instream flows: (1) a summary of Colorado water law with emphasis on its relation to instream flow protection; (2) results of a survey of the principal participants (judges, water referees, water lawyers) in Colorado private water rights system implementation; (3) an examination of minimum streamflow law, its history and constitutional challenges to its implementation; (4) a discussion of minimum flow law implementation; and (5) conclusions concerning operation of minimum flow law within the Colorado general appropriative rights system. Results of the survey indicated that, in general, judiciary principals were satisfied with their system of allocating water. In discussion of Colorado senate bill 97, it was felt that successes, from the viewpoint of those desirous of instream flow protection, have come principally from efforts of water conservation board, division of wildlife and office of attorney general individuals.

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1123

ABSTRACT

Accession Number:
@ 469.2
Huffman, J.L., and others, July 1980, The allocation of water to instream flows, v. I: a comparative study of policy-making and technical information in the states of Colorado, Idaho, Montana, and Washington: final report to the Office of Water Research and Technology, 24 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WATER LAW, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 02

This report, set out in five volumes, examines the impact of alternative institutional approaches for the allocation of water to instream flows, with particular examination of the role of technical information in state decision-making processes for Colorado, Idaho, Montana, and Washington, and examinations of records of public agencies. This volume, Volume 1, defines the scope of the overall study, presents the cumulative contents of the five volumes, and a preliminary comparative assessment for instream flow protection in the four states. The critique of the existing processes was a general one, applicable to most government decision-making on resource allocation issues. However, it was concluded that the problem was a very real one which states should address. Failure to separate technical and policy questions results in neither issue type being adequately addressed. Technical information cannot do more than inform policy makers of the probable consequqences of alternative policies. Selection among policy alternatives can only be done on the basis of some measure of the values of the society that will experience the costs/benefits of the policy decision.

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ABSTRACT

Accession Number:
@ 470
Hughes, T.C., and Gross, R., 1979, Domestic water demand in Utah:
Utah Water Research Laboratory Rep. UWRL/P-79/04, 61 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: PRESENT WATER USE, UTAH

Access Code: 011 Use Code: 01

Multiple regression and frequency analysis of average month, peak month, peak day, and instantaneous water use by various water supply systems in Utah and Colorado are used to develop water demand functions. The research objective was to predict water demand as a function of a small number of independent variables for which data were easily obtainable and thereby provide an attractive method for use by consulting engineers in future planning studies. The independent variables which were significant for monthly and daily demands were cost of water and an outdoor use index which includes the effect of variation in landscaped area and accounts for use of supplementary ditch or pressure irrigation systems. The demand functions were developed with data from a sample of 14 systems varying in size from very small low density rural systems to Salt Lake City's water system. The correlation coefficients (R^2) vary from 0.80 to 0.95. The demand functions were validated by comparing calculated to measured water use for more than 40 other Utah systems. Instantaneous demands are determined for any desired recurrence interval as a function of number of connections.

The demand functions are presented both at best fit (expected value) levels for average month, peak month, and peak day and at recommended design levels for the same time durations. The design levels were calculated by adding to expected values an increment which was based upon standard deviation of the samples.

Instantaneous demand peaks which can be expected once in about 30 years in Utah systems are under 2 gpm per connection for lines serving more than 50 families, 3 gpm for lines serving 10 families, and 5 gpm for lines serving 4 connections.

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1124

ABSTRACT

Accession Number:
@ 470.1
Hughes, T.C., and others, Jan. 1976, Capability of integer programming algorithms in solving water resorce planning problems: Utah Water Research Laboratory Publication PRWG175-1, 101 p.

Contact: NTIS (copy)
Utah State University Library (loan)

Key Categories: UTAH, SURFACE WATER QUALITY, COMPUTER MODELS

Access Code: 002 Use Code: 02

The feasibility of optimizing large regional water resource planning problems by means of integer programming algorithms is analyzed. Two types of integer programming models are developed: (1) a water supply model including 23 separate but geographically related community systems; and (2) a river basin water quality model including 15 point sources of wastewater, 4 types of pollutants, 6 surveillance points, and 7 alternative treatment processes. The water supply model was structured as a mixed integer problem while the water quality model was an all integer problem. Four integer programming algorithms were tested on the sample problems.

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1125

ABSTRACT

Accession Number:
@ 470.2
Hughes, T.C., Richardson, E.A., and Franckiewicz, J.A., June 1975,
Water salvage potential in Utah, v. II, Evaporation suppression by reservoir destratification: Utah Water Research Laboratory Rep. PRWA22-2, 84 p.

Contact: Utah State University Library (loan)

Key Categories: UTAH, COMPUTER MODELS, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

A model is developed for predicting evaporation suppression due to the surface cooling effect of reservoir destratification. The model is based upon measured temperatue profiles at a sample of ten Utah reservoirs. Regression analysis is then used to extend the results to all other deep reservoirs in Utah. Both suppression amounts and costs are estimated for each reservoir. The use of thermal mixing by either mechanical pumping or compressed air appears to have important potential for evaporation suppression on deep reservoirs. There are several environmental benefits claimed for the destratification procedure. Significant improvement in dissolved oxygen (DO), taste and odor, algae production, and many other quality parameters occur in the hypolimnion water. In addition to these human-related benefits, fish habitat may be improved both in the reservoir and downstream from it. A major potential for water conservation in general and water energy production salinity control in particular exists at Lake Powell.

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1126

ABSTRACT

Accession Number:
@ 470.3
Hundley, N., Jr., 1975, Water and the West: the Colorado River Compact and the politics of water in the American West: University of California Press, Los Angeles, 417 p.

Contact: University of California Press (copy)

Key Categories: COLORADO, WYOMING, UTAH, WATER LAW

Access Code: 002 Use Code: 03

The Colorado River, the sole dependable water supply for an area of 244,000 square miles including parts of Wyoming, Colorado, Utah, New Mexico, Nevada, Arizona, California and Mexico, has been the cause of the greatest conflict over water in the American West. At the heart of the conflict is the fact that the river carries enough water for only a handful of cities, industries and farms. The movement for the Colorado River compact of 1977 is traced, the complex legal and political battles that spawned the conflict and which continue to influence the lives of westerners today are described. A major topic is federalism; the attempt of the Colorado basin states to work out their destiny in concert with the federal government as each side has sought to assert its supremacy in areas coveted by the other.

1127

ABSTRACT

Accession Number:
@ 470.4
Huntley, C.W., Main, R.B., and Lane, W.L., 1976, Streamflow simulation with the Colorado River Simulation Model: Clyde, C.G., Falkenborg, D.H., and Riley, J.P., eds, Colorado River basin modeling studies, Utah Water Research Laboratory, p. 141-167.

Contact: Utah Water Research Laboratory (copy)

Key Categories: COLORADO, WYOMING, UTAH, SURFACE WATER QUANTITY, COMPUTER MODELS

Access Code: 011 Use Code: 01

This paper discusses a computerized river basin simulation model and its application to the Colorado River Basin. The model was developed to provide the user with the capability of varying demand and hydrologic inputs at points throughout the basin, thus permitting an examination of the effects of these variations on water availability and salinity concentrations in the basin.

The purpose of the paper is to discuss the concept and capabilities of the model. Node structure and reservoir demand, and hydrology inputs are discussed. Salient points of the model operation are summarized and output options are listed. Special features of the model required for adaptation to the Colorado River Basin are an important part of the paper. Example results of a typical model run and associated costs are included.

The model utilizes the node concept, each node representing a specific reach of river. The node structure which the user sets up for the model forms the pattern for all other inputs and model computational order. Computations are made on a monthly time basis. Four groups of input are required: node structure; reservoir operational data; demand data; and hydrology data. Desired output is written as the computations are made or written on a file and extracted after the run is complete depending on the options specified at the beginning of the run.

294 not 84

1128

ABSTRACT

Accession Number:
@ 470.5

Hurley, P.A., Dec. 1968, Augmenting Colorado River by weather modification: ~~ASCE Proceedings,~~ Journal Irrig. and Drainage Div., v. 94, no. IR4, Paper 6271, p. 363-380.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 03

A perspective on the potential for increasing winter precipitation over mountains of the upper Colorado River basin is presented in an engineering context for water development planners. The resulting augmented spring runoff, regulated by existing reservoirs, can provide additional water to meet growing demands for the region where present water supplies are becoming critically short. Increasing the November through April precipitation by 15% over 14,200 sq. mi. of target areas generally located at elevations above 9,500 ft will yield an average additional runoff of 1,870,000 acre-feet annually. This practical capability to enhance the winter snowfall should be developed by the mid-1970's through the outlined $25,000,000 applied research field program.

1129

ABSTRACT

Accession Number:
@ 470.6
Hurr, R.T., 1981, Statewide water-use inventory: in Water resources investigations of the U.S. Geological Survey in Colorado - fiscal year 1981: U.S. Geological Survey Open-File Report 81-150, p. 11.

Contact: Ted Hurr (status)

Key Categories: COLORADO, WATER USE

Access Code: 011 Use Code: 01

The purpose of the program is to develop an inventory procedure to obtain both current and future water-use data and to develop a computerized data base that can be assessed by a variety of users. Water-use data are being obtained by contacting users and determining what data they are collecting. If they are already collecting water-use data they are asked to complete a questionnaire in which water-use data are tabulated. If they are not collecting water-use data, techniques are derived for converting available data into water equivalent water-use data or techniques for collecting water-use data.

To date, the state data base includes: Water-rights tabulation; surface-water distribution maps; irrigated-acreage tabulation; and total yields of wells by county, township, irrigation district, and State water division. All major municipalities in the State have agreed to provide water-use and Standard Industrial Classification data. Thirty-one utility companies having irrigation accounts have agreed to provide energy-consumption data for use in estimating ground-water withdrawals. These data have been aggregated by irrigation method and by township. Data have been collected on the quantity of energy consumed to produce water from several hundred wells. The data will be employed to determine the amount of ground-water pumped when the energy consumption is known.

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ABSTRACT

✓ Accession Number:
@ 471
Hurr, R.T., Wilson, W.W., Welder, F.A., and Emerson, R.L., 1969, Records of selected wells and springs in the Rulison Project area, Garfield and Mesa Counties, Colorado: U. S. Geological Survey Open-File Report Rulison-2, USGS-474-40, 17 p. plus 1 plate.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SPRINGS

Access Code: 011 Use Code: 02

An inventory of wells and springs in the Rulison project area and vicinity was made from March 20 - April 3 and May 20-25, 1969, by the U.S. Geological Survey in cooperation with the U.S. Atomic Energy Commission. The Rulison project is part of the Plowshare Program and is an experimental study to determine the commercial feasibility of stimulating natural-gas production in the Rulison gas field by fracturing the reservoir rock with a nuclear explosion. The purpose of this study was to document the physical condition of wells and springs and to collect samples of water prior to the nuclear event, for chemical analyses. The inventory of wells and springs was limited to a circular area having an approximate radius of 20 kilometers from the emplacement hole. The location of the emplacement hole is in the NE1/4NE1/4SW1/4 sec. 25, T. 7 S., R. 95 W., in Garfield County, Colorado about 65 kilometers (40 miles) northeast of Grand Junction, Colorado, and about 20 kilometers (12 miles) southwest of Rifle, Colorado.

ABSTRACT

Accession Number:
@ 472
Hutchins, W.A., 1974, Water rights laws in the nineteen western states: Vol. I and II, U.S. Dept. of Agriculture, Washington, D.C.

Contact: none

Key Categories: COLORADO, UTAH, WYOMING, WATER LAW

Access Code: 002 Use Code: 02

This work is a comparative analysis of the development and status of the constitutional provisions, statutes, reported court decisions, and some administrative regulations, practices, and policies regarding water rights laws in the Western States. The analysis includes the nature of such water rights and their acquisition, control, exercise, transfer, protection, and loss. In addition to the relevant State laws, Federal, interstate, and international matters are also discussed. An extensive appendix includes summaries of selected components of the water rights systems of each State. Although critical or laudatory comments are occasionally included, Mr. Hutchins' general purpose was to objectively portray the development and status of the laws rather than to propound his views on what the laws should be.

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ABSTRACT

√ Accession Number:
@ 473
Hutchins, W.A., and Jensen, D.W., Oct. 1965, The Utah law of water rights: State Engineer of Utah in cooperation with Natural Resource Economics Division, Economic Research Service, U.S. Dept. of Agriculture, Salt Lake City, Utah..

Contact: BLM - Vernal (loan)

Key Categories: WATER LAW, UTAH

Access Code: 112 Use Code: 03

This report reviews and interprets Utah water rights law of the Utah Code Annotated as revised to 1965. Separate chapters discuss water of water courses (doctrine of prior appropriation, procedures for appropriating water, restrictions on right to appropriate, classification of water rights, loss of water rights, etc.); diffused surface waters (abnormal flood overflow, drainage and obstruction of flow); other waters at the surface (salvaged and developed waters; waste, seepage and return waters; springs); groundwaters (classification, appropriation, etc.).

1130

ABSTRACT

Accession Number:
@ 475.1
Hutchinson, D.L., May 1981, Investigation of the Geokinetics horizontal in situ oil shale retorting process, quarterly report, Jan. to March 1981: U.S. DOE Rep. LETC-10787-77, 33 p. plus appendices.

Contact: Neil Young (loan)
NTIS (copy)

Key Categories: RECLAMATION, IN-SITU, EFFLUENTS

Access Code: 002 Use Code: 02

This is a quarterly progress report covering the period January to March, 1981 under the U.S. DOE cooperative agreement with Geokinetics. Appendix A presents first-year results of the Forest Service Revegetation study at the Geokinetics site. The study is investigating alternative methods to revegetate retorted areas. This report evaluates the first-year survival and growth of 21 species of plants and also presents a discussion of the results and recommendations for future study.

Appendix B summarized the results of a study to qualitatively assess the tolerance of native and certain introduced species of vegetation to irrigation with waters produced during retorting. The two experiment conducted revealed significant detrimental affects. Statistical chemical characterizations of the waters used in these experiments are presented.

1131

ABSTRACT

Accession Number:
@ 473.2
Hutchinson, D.L., and Lekas, J.M., March 1981, Investigation of the Geokinetics horizontal in situ oil shale retorting process, fourth annual report, 1980: U.S. DOE Rep. LETC-10787-73, 80 p. plus appendices.

Contact: NTIS (copy)
Neil Young (loan)

Key Categories: IN-SITU, RECLAMATION

Access Code: 002 Use Code: 03

This is the 1980 annual progress report under the U.S. DOE cooperative agreement with Geokinetics. Appendix A of this volume presents the final report on the "Vegetation, Ecoclimatic, and Soils Factors" study conducted by Geokinetics at its experimental site in the Unitah basin. The report qualitatively discusses the results of field studies on vegetation (vegetation mapping, floristics, phytosocialogical studies, primary productivity studies), ecoclimatological monitoring (continuious recording of temperature and precipitation in plant growth zone), and soil surveys and analysis (descriptions of soil types, mapping of soil series, etc.).

1132

ABSTRACT

Accession Number:
@ 473.3
Hyatt, M.L., Riley, J.P., McKee, M.L., and Israelson, E.K., 1970, Computer simulation of the hydrologic-salinity flow system within the Upper Colorado River basin: Utah Water Research Laboratory Rep. PRWG54-1, 125 p.

Contact: Utah State University Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS, SURFACE WATER QUALITY, SALINITY

Access Code: 182 Use Code: 02

Changes in the hydrologic equilibrium of a river basin resulting from resource development also produce changes in the quality pattern. Since the burden of quality maintenance must be shared by users (just as are quantities) predictions are needed for quality changes which might result from contemplated development at any specified location within the river system. This study reports the development of a computer simulation model of the water and salt flow systems within the Upper Colorado River basin.

Because of the close relationship between the hydrologic and salinity flow systems, an understanding of the hydrologic system is essential to successful management of the salinity system. In this study development of a hydrologic model is based on water budgeting or accounting procedures, in which available data on historical water flows, municipal and industrial uses, and the demands of agriculture are used. The salinity dimension is then added, and the joint hydrosalinity model is verified (calibrated and tested) by comparing computed and observed output values.

The utility of the model is demonstrated by applying it to a particular subbasin of the San Juan River and predicting the effects on downstream water quantity and quality of developing a large irrigation project within the area.

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